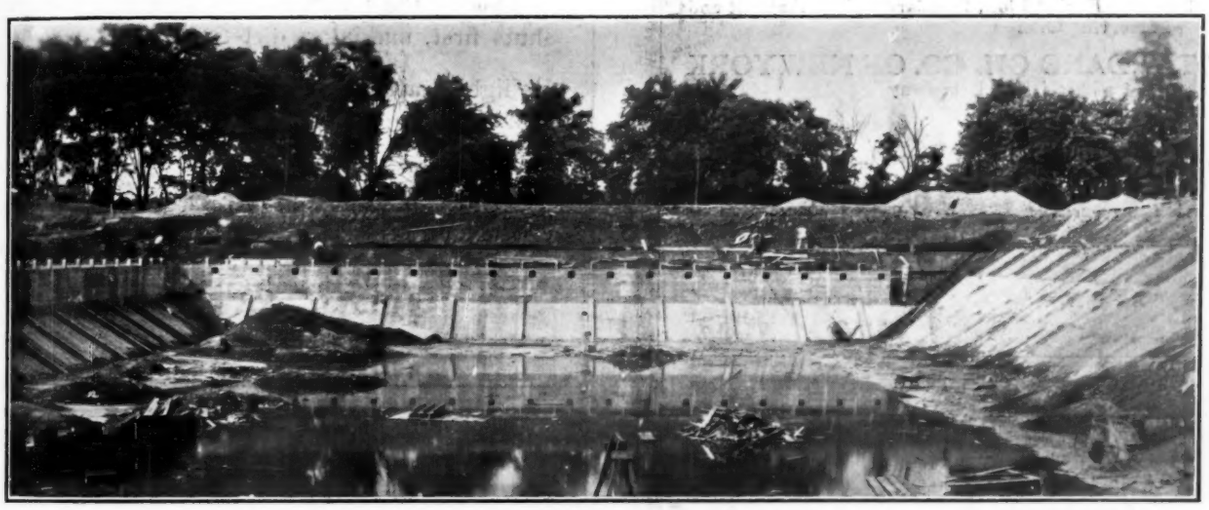
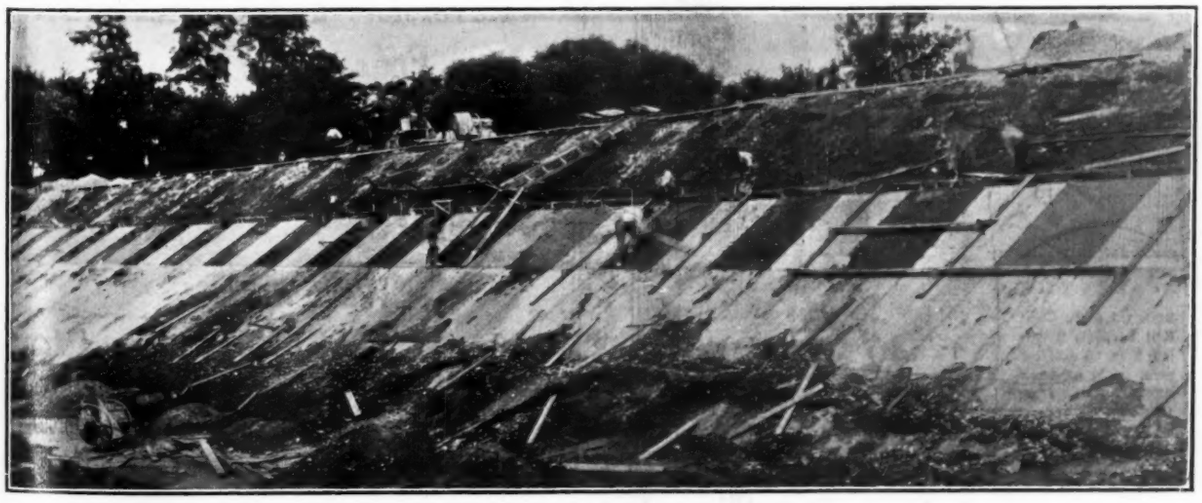
JUL 27 1922

PUBLIC WORKS

CITY COUNTY STATE



VIEW OF OUTLET END OF SEDIMENTATION BASIN.
The outlet flume, with its openings, is seen half way up the further slope and the continuation of it at the left.



CONCRETING SLOPE OF SEDIMENTATION BASIN.
Filling in the alternate slabs of the top tier. The chute for placing the concrete is seen in the middle of the picture. To the right a workman is screeding a slab just placed. The upper part of the bank is really the levee, and will not be concreted.

VIEWS OF SEDIMENTATION BASIN, HARRISBURG WATER PURIFICATION PLANT
This plant will be described in next week's issue.

JULY 22, 1922

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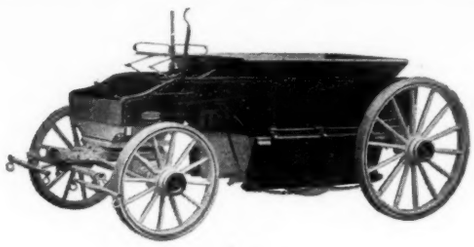

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VOL. 53 NO. 4

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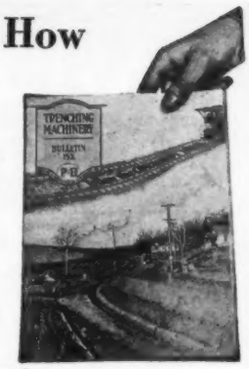

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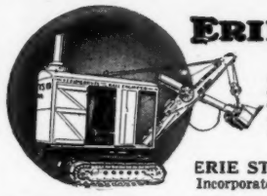

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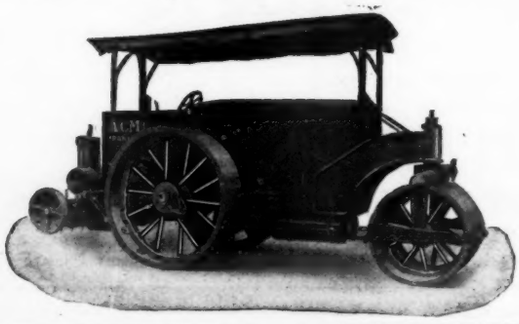

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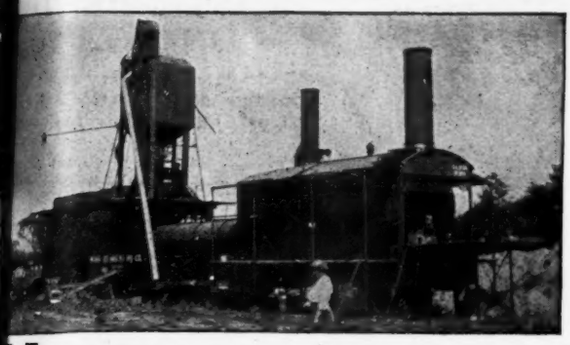

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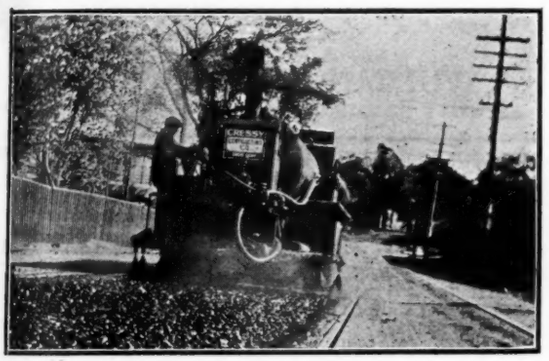

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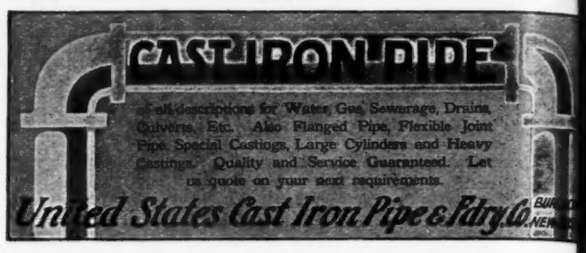

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No. 4

PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 53 July 22, 1922 No. 4

Resurfacing Old Pavements

Methods employed by several score of cities in resurfacing old concrete, brick and other kinds of pavement, as reported by city engineers.

Although some pavements are more durable than others, no type or kind of pavement is everlasting, but wear begins with the first traffic and continues unceasingly thereafter. Some pavements it is possible to maintain continuously, these including both waterbound and bituminous bound macadam, bituminous concrete, sheet asphalt and the various other bituminous pavements. Pavements made of separate large units, such as brick, stone and wood block, and concrete pavements can be repaired only at longer intervals if the same material is used, although in some cases incipient holes are filled with bituminous material. With almost any pavement the time will finally come when further repairs will not be economical, but the whole pavement should either be replaced or should be covered with a new wearing surface.

The following article is prepared from information furnished by several hundred city engineers describing the materials and methods employed by them in resurfacing or renewing the surface of pavements in their respective cities. So far as possible the different methods are arranged according to the materials constituting the old pavement, while the cities and states cited are given in their alphabetical order.

The information was furnished this year and in most cases applies to the practice followed in the year 1921.

OLD BRICK PAVEMENTS

In Bisbee, Ariz., the worn out brick is removed and a concrete surface is placed upon the old concrete base.

In New Haven, Conn., a new wearing surface of 1½-inch binder and 1½-inch top is ordinarily laid directly on the old brick. If the brick are removed and the old concrete base is used, the additional thickness is supplied with an extra thickness of binder and the top or wearing surface may be increased to 2 inches.

The city engineer of Meriden, Conn., C. Perry Prann, says: "I would not recommend resurfacing of stone block, brick or concrete. If there is a concrete base of sufficient thickness I would prefer to pull out the old brick or stone block and relay on old foundation. A resurfacing job on either of the above types of pavement in order to give good service must be an inch or two thick and such resurfacing makes too shallow gutters. In the case of a concrete pavement I think that the only thing to do is to repair it as long as it will stand repairing and then replace it."

Bloomington, Ill., expects this year to resurface with one-inch binder and two-inch wearing surface of asphaltic concrete.

In Chicago, Ill., the interstices of the pavement are cleaned out and 1½-inch of binder is laid and on this 1½-inch of sheet asphalt or asphaltic concrete.

Danville, Ill., has resurfaced some brick streets by removing the old wearing course and laying 3-inch vertical fibre brick on a 2-inch sand-cement bed, using asphaltic filler. This cost $2.75 per square yard including the removal of the old brick. In other cases the old brick surface has been covered with a 2-inch top of Bermudez sheet asphalt on a one-inch binder, this costing $2.47 per square yard.

In Peoria, Ill., the old brick surface is well swept and washed, if necessary, and then painted with a thin coat of hot asphaltic cement. A binder course is then rolled into all depressions until there is a minimum thickness of one inch over the entire surface. A 2-inch course of sheet asphalt is then applied in the usual way. Before applying the binder the old brick surface is taken up and relaid where necessary along the edges of car tracks, other improvements, etc., to permit the added thickness of the new pavement.

Covington, Ind., has resurfaced old brick pavement by removing the brick and replacing with concrete.

Gary, Ind., resurfaces old brick with sheet asphalt.

Lafayette, Ind., has resurfaced brick streets by renewing the brick.

In Logansport, Ind., depressions in the brick pavement are filled with binder course and then the whole pavement is covered with a wearing course of sheet asphalt which is tapered off at the car track

rails, sewer castings, etc. A portable plant is used in this work.

Cedar Rapids, Ia., uses asphaltic concrete for resurfacing brick and concrete pavements.

Fort Dodge, Ia., cleans off the old brick surface and covers with one-inch of binder and 2 inches of sheet asphalt.

In Des Moines, Ia., brick surface is thoroughly cleaned by flushing and deep depressions are leveled up either by filling with used brick or by building up with asphaltic binder. The surface is then treated with a sprinkle coat of asphaltic cement and one-inch binder course is applied; followed by 1½ inches of sheet asphalt or 2 inches of asphaltic concrete. In 1921 an old 2-course brick pavement was treated by residents under private contract as follows: The surface was thoroughly cleaned and low places leveled up by filling with hard rock and Tarvia X. Tarvia B was spread hot with an oil spreader at about ½ gallon per square yard. A heavy course of gravel retained on a 1-inch screen and passing a ½-inch screen was applied and rolled with a 10-ton roller. A second coat of hot Tarvia B was applied at about ½ gallon per square yard and a second coat of the same gravel sufficiently thick to cover, and traffic was admitted immediately. This surface wears almost to the appearance of asphaltic concrete, the loose gravel being held by the Tarvia and filling up by bleeding from below. Some spots will have to be re-treated and some maintenance done when warm weather permits, as the workmen were not experienced and did not get a uniform distribution of pitch. When laid in warm weather and given some attention to see that all spots are uniformly treated, the results are very acceptable. The complete cost was less than 60 cents per square yard. The street carries a very heavy automobile traffic and much heavy hauling and traverses the highest value property in the city. The width of the roadway is about 40 feet and the length of the work about one mile.

Ottumwa, Ia., has practiced taking up the old brick and replacing with new brick or creosoted wood block on the old base. They may resurface some old brick pavement this year with asphaltic concrete.

Manhattan, Kans., covers the brick with asphalt spread with a squeegee.

Parsons, Kan., resurfaces old brick with asphalt concrete, Topeka mixture, in about the following proportions: Chatts, 275 pounds; river sand, 375 pounds; bank sand, 200 pounds; stone dust, 80 pounds; asphalt cement, 80 pounds. Texaco No. 45 was used in all this work.

In Wichita, Kans., the old brick surface is leveled up with concrete and binder and is then surfaced with standard sheet asphalt or asphaltic concrete.

Ashland, Ky., resurfaces brick pavements with new brick.

Ludlow, Ky., last year resurfaced 12,000 yards of old brick street by removing the brick and replacing it with asphalt macadam.

In Baltimore, Md., badly spalled areas of brick pavement have been given a squeegee coat of asphalt road binder applied hot and covered with pea gravel or stone chips.

Frederick, Md., resurfaces old brick streets by turning the brick and relaying them.

Hagerstown, Md., has surfaced old brick pavements with asphalt macadam, which has not proved very successful.

Battle Creek, Mich., resurfaces with sheet asphalt laid in the regular manner.

Grand Rapids, Mich, removes the old brick from the concrete foundation and relays with new brick.

Kalamazoo, Mich., lowers the brick along the curb and around the manholes and resurfaces with sheet asphalt.

Midland and Muskegon, Mich., resurface with sheet asphalt top.

In Saginaw, Mich., brick surface is thoroughly cleaned with steel brushes and is then swept with fibre brushes and is finally flushed and scoured with water under 40 to 50 pounds pressure using a fire hose. The work is done only during dry, hot weather. All depressions are then filled with a close binder thoroughly rolled or tamped in placed to bring the surface approximately parallel to the required contour. This is followed as closely as possible with the laying of a close binder course and on this a top course of sheet asphalt. Extreme care is taken that the brick surface is sufficiently rough. If there are any smooth places the bricks are chipped and the surface roughened so as to insure a bond.

Rochester, Minn., cleans the old surface, fills the depressions and applies a 2-inch bitulithic wearing surface.

In St. Paul, Minn., the old surface is cleaned, leveled up with binder not to exceed 3 inches in depth, and then covered with a wearing surface of either sheet asphalt or asphalt concrete.

Joplin, Mo., resurfaces old brick pavements by pouring from 1/2 to 3/4 of a gallon of asphalt or tar product on the cleaned surface, covering with Joplin chats and rolling with a 7-ton roller.

Sedalia, Mo., expects to resurface about 30,000 square yards of rough brick pavement with a mat coat of broken stone and asphalt, the wearing surface to be from 1/2 inch to 3/4 inch thick after rolling. The specifications provide for thoroughly cleaning the old pavement, bringing up depressions that exceed 3/4 of an inch deep with asphaltic macadam, then applying a priming coat of asphaltic oil followed by a coat of liquid asphalt at the rate of about 1/2 gallon per square yard. This is followed immediately by spreading a layer of crushed limestone of a size between 1/4 and 3/4 inch to uniform depth of a half an inch, following which the roadway is thoroughly rolled with a 5-ton tandem roller. After rolling, the roadway is swept clean of all excess stone and another application of liquid asphalt is made at a rate of from 1/4 to 1/2 gallon per yard, which is covered with limestone chats ranging up to 1/2 inch and the pavement is again thoroughly rolled and is then ready for traffic.

Kansas City, Mo., thoroughly cleans the surface and joints of old brick pavement by heating and sweeping, and then makes a very light application of A. C. along the joints and surfaces with 2 inches of asphaltic concrete placed hot and thoroughly rolled.

Springfield, Mo., apparently uses practically the same method as Sedalia.

St. Louis surfaces old brick pavement with sheet asphalt or bitulithic.

Lincoln, Nebr., resurfaces with 2 inches of asphaltic concrete.

Omaha, Nebr., uses either asphaltic concrete or sheet asphalt with binder.

Newark, N. J., for several years has resurfaced brick streets with a coat of asphalt approximately one inch thick.

Endicott, N. Y., replaces old brick with new.

Middletown, N. Y., has resurfaced old brick with a 2-inch warrenite pavement at $2.70 per square yard.

Norwich, N. Y., resurfaces brick and other pavements with an application of No. 1 stone and Tarvia A.

Olean, N. Y., has done some brick patching using Tarvia K. P. and crushed stone for filling holes and depressions. Where these are of considerable area or depth, new brick is used.

Poughkeepsie, N. Y., covers the old surface with a light coat of asphalt macadam.

In Rochester, N. Y., the contractor is required to take up and remove all old brick which the engineer believes should be removed, and these are replaced with sufficient Class C concrete to bring the foundation up to the required height to permit a binder course of one-inch and a wearing surface of 2 inches of asphalt to be laid thereon. The part of the old pavement not disturbed is thoroughly cleaned by brooming and the joints raked out and cleaned of all organic matter.

In Schenectady, N. Y., the old brick are removed, an additional amount of cement concrete is applied to the base and a top of stone-filled asphalt is then applied, using a binder course, where necessary.

In Troy, N. Y., 11,000 square yards of bitulithic was laid last year over old brick pavements.

In Waverly, N. Y., old brick pavements are thoroughly washed, dried and swept clean and Tarvia X is then applied, about 3/4 of a gallon to the square yard, with a force distributor. Following this, a lighter layer of pea-sized screened gravel is evenly scattered over the entire surface.

The city manager of Greensboro, N. C., P. C. Painter, writes that he has found that old brick pavements can best be resurfaced with about 2 inches of bituminous concrete, which is very satisfactory where there are no street car tracks on the street.

Akron, Ohio, provides brick gutters (presumably new ones) 3 to 5 feet wide, the remaining surface is scrubbed and the soft places dug out and replaced with concrete. A binder course is then laid on the old pavement, which is first roughened where smooth, and is followed with 1½-inch asphalt wearing surface.

Bellaire, Ohio, sweeps with steel brooms and flushes with water and sweeps again if necessary; fills depressions with concrete, lays a one-inch binder course and a 1½-inch wearing surface of sheet asphalt.

In Bucyrus, Ohio, the surface is cleaned thoroughly, low spots filled with Tarvia K. P. mixture, the street is then sprinkled with tar or asphalt and covered with bird's eye gravel. "This gives a mat which is smooth, resilient and durable,' says F. L. Niederheiser, city engineer.

In Canton, Ohio, old brick pavements 15 to 32 years old are covered with one-inch to 1½-inch binder and 1½ to 2-inch sheet asphalt surface, holes being first filled with bricks or cement. Gutters from 27 inches to 54 inches wide are raised to be level with the new surface.

In Cleveland, Ohio, the surface is thoroughly cleaned and large depressions filled with portland cement concrete. At intersections and some other places where a higher elevation is undesirable, the brick is relaid at a lower grade. On car track streets the pavement along the rail is relaid far enough from the rail to allow a crown to be worked out in the asphalt top. New gutter grades are calculated and marked on the face of the curb. A one-inch asphalt binder is then placed, mixed 5 parts A. C., 12 parts sand and 83 parts stone. This is spread and rolled in the usual manner and is followed with a top mixture which is rolled to a finished thickness of 1½ inches. The top mixture is proportioned 10½ parts A. C., 76 parts sand and 13 parts filler. These proportions are, of course, subject to more or less variations, according to the quality of the A. C. A. C. with penetration 50 at 77 degrees F. is used on most streets. A number of streets have been resurfaced by municipal forces during the past few years with very satisfactory results.

In East Cleveland, Ohio, a large number of streets had been laid with brick on sand without concrete base. Parts of this pavement in bad condition are removed and concrete laid to level this up with the original surface. The curb is removed, redressed and reset with drains under it. It is usually found necessary to remove about 1/3 of the area of the old pavement and replace about 1/3 of the curb. A 2-inch asphalt concrete top is then laid. The cost of this resurfacing is about 2/3 that of a new pavement with a 2-inch surface on a 6-inch base.

In Fremont, Ohio, badly broken areas of brick are removed, the sub-base is compacted and the space filled with concrete or binder to the general level of the original surface. At crossings and connections to other street pavement the brick is removed where necessary and replaced with concrete or binder, and the same is done wherever the pavement would be too high after resurfacing. The pavement is then thoroughly swept with steel brooms and flushed. Wherever depressions in the old brick exceed 3 inches in depth, the old pavement is taken up and replaced with portland cement concrete. Where the depth is less than 3 inches the hole is brought up to grade with asphaltic concrete binder. The old brick pavement is then treated with a paint coat composed of 2 parts of asphaltic cement dissolved in 3 parts of naphtha, which is applied to the brick after they are thoroughly dry and clean by means of sprinkling cans. Upon this is laid an asphaltic concrete binder 1½ inches thick and on this a 1½-inch asphaltic wearing surface.

(To be continued)

Hetch Hetchy Dam Concrete Plant*

Aggregate for 375,000 yards of concrete handled by steam shovel and railroad dump cars. Crushed, screened, washed and delivered by belt conveyors to 8,000-yard storage pile. Large mixers fed from overhead bins deliver maximum of 2,000 yards daily to quadruple 350-foot hoisting tower. Bulk cement unloaded by power scraper and binned with screw conveyor

The Hetch Hetchy dam will contain 375,000 yards of masonry, of which 300,000 yards of 1:3:6 cyclopean concrete will contain at least 10 per cent. of plums, at unit prices of $11.80 and $11.00 respectively for masonry laid below the original stream bed and above it. There will also be 75,000 yards of 1:2½:5 concrete at prices of $15.00 to $14.30 per yard respectively for that below and above the original stream bed. The concrete has now been laid up to an elevation above the original bed of the river and about one-half of the total amount has been placed by a specially designed digging, transporting, crushing, washing, screening, conveying, storing, mixing, hoisting and distributing plant that eliminates a large amount of hand labor and executes a large proportion of the work by gravity.

AGGREGATE

Sand is taken from a bank 30 feet high in a glacial deposit about 4 miles up stream from dam in the reservoir basin. A railroad track has been laid by the sand pit where a Marion No. 31 shovel with crawler tractor loads the sand into cars. The sand carries some oversize and requires screening, but no washing. A considerable amount of sand has to be wasted, however, as there is an excess of mica and organic matter.

Stone for concrete is excavated from a gravel bed about two miles above the dam, and the railroad to the sand pit also handles the stone. A Bucyrus 70 C standard shovel loads stone into the cars, which haul it to the crusher plant a quarter of a mile from the dam. All of the stone is washed.

CRUSHING PLANT

The crushing plant consists of a No. 10 Kennedy Van Saun primary crusher with 24x36-inch Power & Mining Machinery jaw crusher as an auxiliary. A 30-inch belt conveyor carries the product to a revolving screen, where it is washed and all passing a ½-inch mesh jacket is wasted through a sluice flume about 400 feet long.

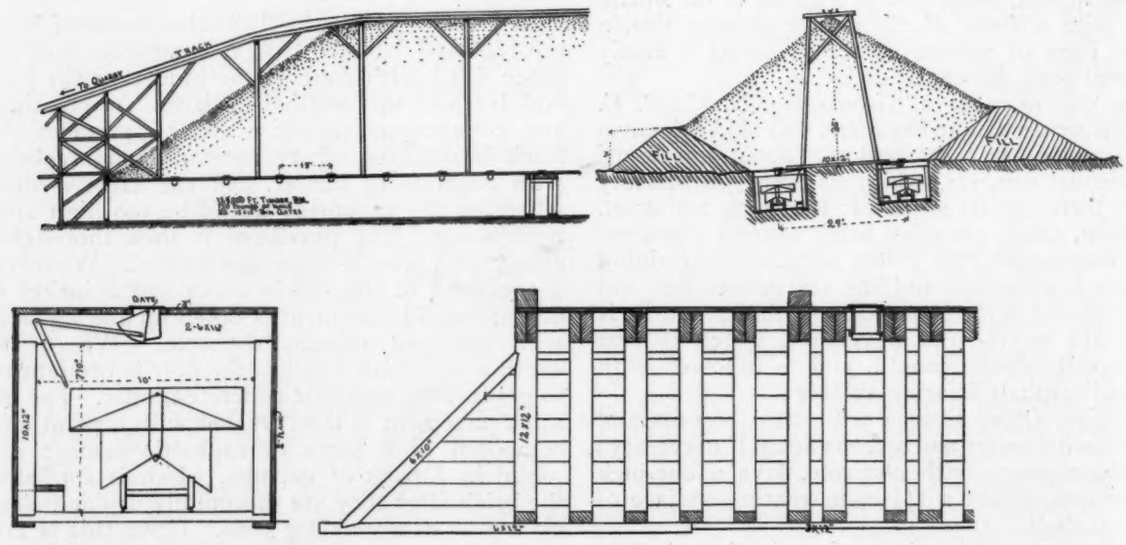
All material not passing the 2½-inch screen perforations is recrushed in a No. 6 McCully crusher and a No. 49 gearless Kennedy Van Saun crusher. After recrushing, the rock is again screened to take out the crusher dust and transported by a belt conveyor to 8,000-yard storage piles.

TRANSPORTING AND MIXING

Twin tunnels run under the storage piles and in them trains of 4-yard cars are loaded by gravity through gates in the tunnel roof and deliver the aggregate to the mixing plant.

Aggregates are brought to the dam from the storage pile in trains, each of twelve 4-yard cars, which dump the rock and sand into their respective bins over reciprocating feeders, which in turn deliver to 200-foot 30-inch and 24-inch conveyor belts traveling on a 33 per cent. slope to the mixer storage bins.

*The design of the Hetch Hetchy dam and the diversion work for its construction were described July 8th. The methods and plant for excavating the foundation, 117 feet below the bottom of the river, were described July 15th.



RECEIVING TRESTLE, STORAGE PILE AND DELIVERY TUNNEL FOR HANDLING CONCRETE STONE.

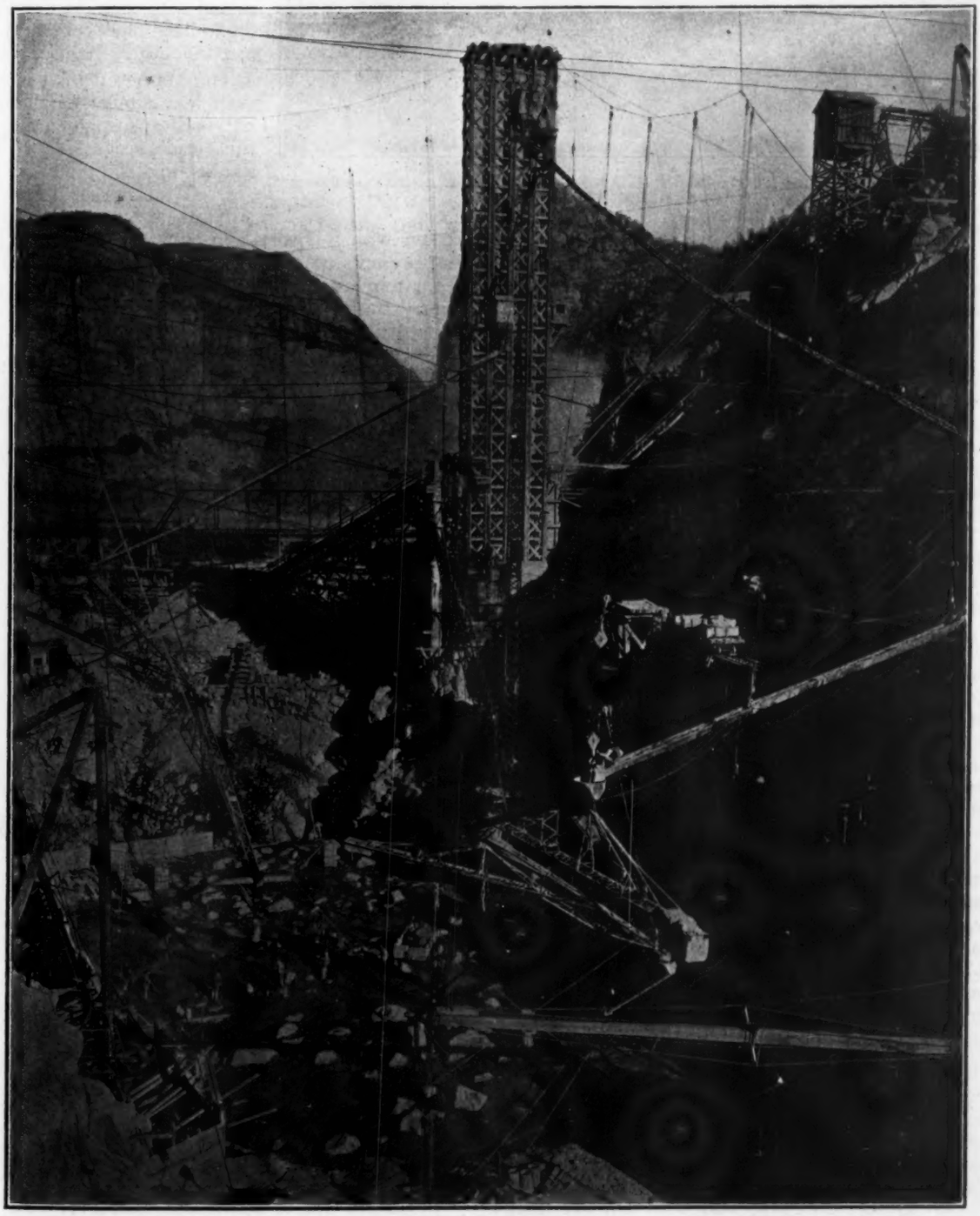
Cement is received in bulk, the cars being unloaded by an electrically driven power scraper which pulls the cement from the car to a hopper, which opens under the car door like a kitchen flour bin. This hopper feeds cement into 10-inch screw conveyors on 30 per cent. incline which take the cement to the top of a 13,000-barrel hopper-bottom storage house.

Under the storage bin there is a 4x6-foot tunnel in which there is installed another 10-inch screw conveyor which carries cement to the scale house. Batches are weighed on Hoepner automatic scales and dumped into an 8-inch pipe leading direct to the mixers.

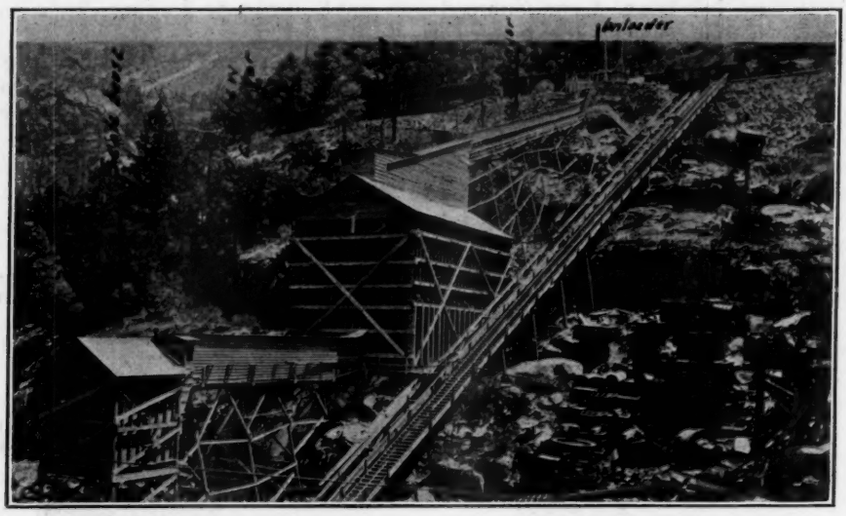
The mixing plant is located under 600-yard storage bins close to the face of the dam. Here two 81-foot Ransome mixers are operated by hydraulic cylinder control, which dump the automatic measuring boxes into mixers and dump the concrete out of the mixers, one man controling all the operations of each mixer.

DISTRIBUTING CONCRETE

The concrete goes from each mixer to a hopper, which discharges to 36-foot Insley tower buckets in



SPOUTING FOUNDATION CONCRETE THROUGH CHUTES SUSPENDED DIRECTLY AND ON TRUSSES FROM CABLEWAYS.



PLANT FOR UNLOADING, STORING AND DELIVERING AGGREGATE TO CONCRETE MIXERS.

a four-compartment wood tower 350 feet high, just beyond the up-stream face of the dam. From the tower the concrete flows in two lines of 16-inch chutes with double 50-foot counterweights. Two buckets dump into each line of chutes. The chute lines are suspended from 1¼-inch plow steel cables, and counter-weight sections from a 2¼-inch used cableway cable.

All materials and men are transferred from the Hetch Hetchy railroad tracks to the bottom of the foundation pit by a 15-ton Lidgerwood cableway which was also used to lower an 18-ton locomotive from the high level tracks.

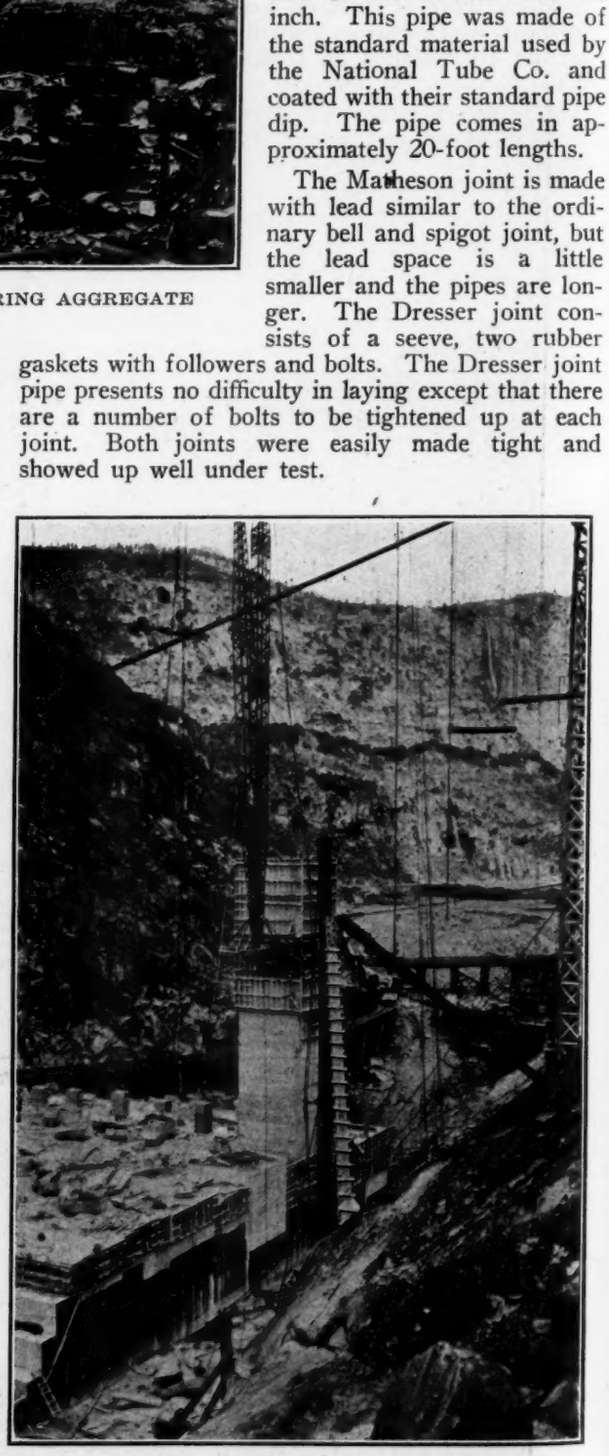
The derricks handling the cyclopean plums are installed high above the working level on 16x16-foot concrete solid pedestals that are eventually built into the body of the dam and form integral portions of it. They are carried up in courses built in telescopic sliding wooden forms handled by the derrick itself. During last March and April, when the work was partly shut down on account of an interruption in the power service, the pedestals were built up to a height of 60 feet above the general surface of the concrete by a small force of men working with the limited power available, and thus avoiding future delay for raising the derrick as the work progressed.

The concreting is largely done in two 8-hour shifts at the rate of about 40,000 yards per month. The crushing plant was designed by the Kennedy Van Saun Company and later modified by the contractor to give greater speed and capacity. The mixing and placing plants and bulk cement layout were designed by A. E. Paddock, construction engineer for the contractor. C. R. Rankin is the resident engineer for the city of San Francisco and H. J. Lawler is the contractor's representative.

Steel Distribution Mains in Detroit

The city of Detroit in 1921 laid as an experiment a quantity of small steel pipe. Of this, 4,577 feet was 13½-inch O. D. Matheson joint pipe as manufactured by the National Tube Co., 1,600 feet was 18-inch O. D. steel pipe laid with Dresser joints. The 13½-inch size was selected as this outside dimension is that of 12-inch Class C cast iron pipe, so that this steel pipe could be used interchangeably with 12-inch cast iron pipe in connection with fittings and valves. The thickness of wall of the 13½-inch steel pipe was .31 inch, and of the 18-inch was .33 inch. This pipe was made of the standard material used by the National Tube Co. and coated with their standard pipe dip. The pipe comes in approximately 20-foot lengths.

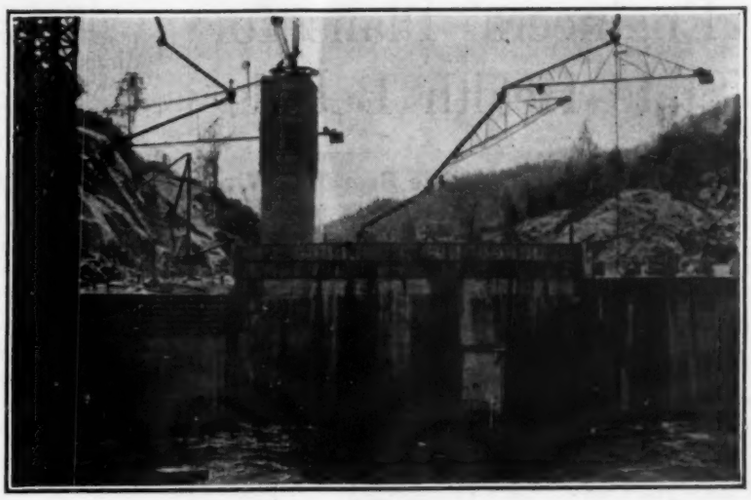
The Matheson joint is made with lead similar to the ordinary bell and spigot joint, but the lead space is a little smaller and the pipes are longer. The Dresser joint consists of a seeve, two rubber gaskets with followers and bolts. The Dresser joint pipe presents no difficulty in laying except that there are a number of bolts to be tightened up at each joint. Both joints were easily made tight and showed up well under test.



BUILDING 16 x 16 FOOT CONCRETE TOWER TO SUPPORT DERRICK AND AFTERWARDS FORM PART OF PERMANENT DAM.

When necessary to cut the pipe, this is done with an acetylene torch. Considerable care has to be used in handling steel pipe of any kind so as not to damage the coating.

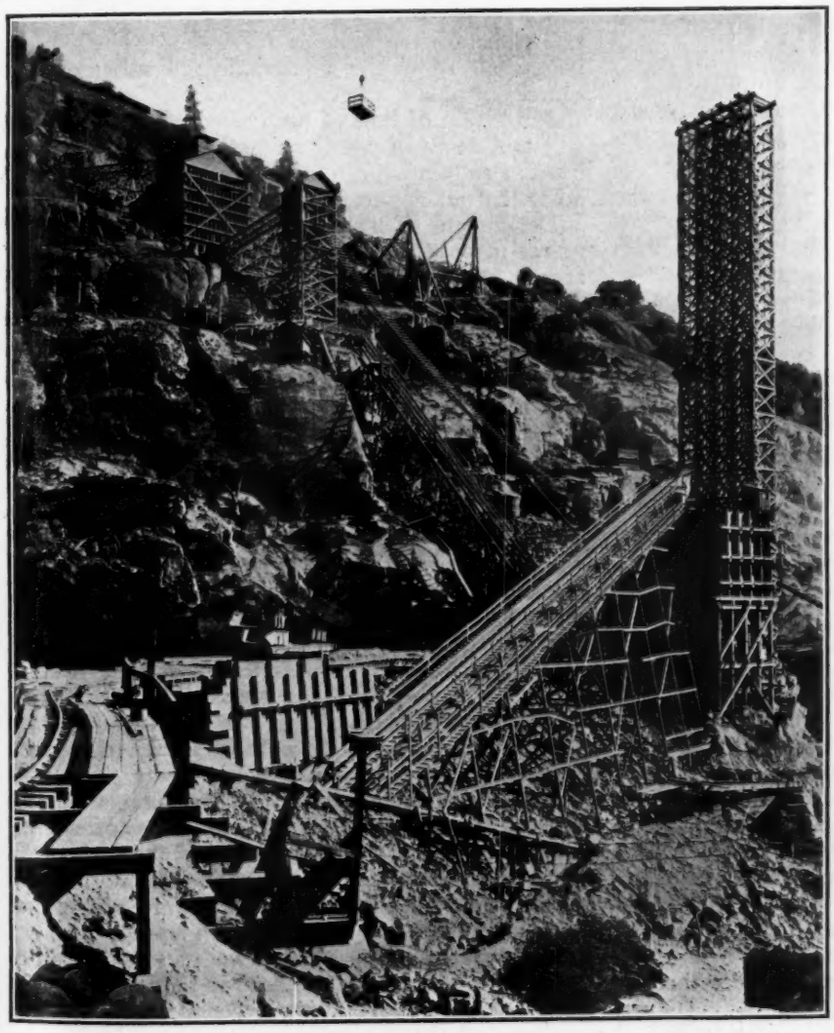
In tapping small steel mains on account of the thin wall there are only a few threads engaged between the corporation cock and the wall of the pipe. For this reason the 13½-inch O. D. has been limited to one-inch taps and no larger. On the larger sizes larger taps can be used, but considerable difficulty has been encountered with the taps themselves.



DERRICK TO HANDLE PLUMS INSTALLED ON CONCRETE TOWER.

Accuracy of Old Meters

There are in the city of Detroit about 150,000 meters in service. The water department tests large meters in place and systematically removes small meters for tests and repairs as one of the routine duties of the department. In less than five months of 1921 the department tested 3,544 meters of 2-inch size and smaller. Of this number only 1,545 were found to register within 4% of the correct amount. Nine registered between 4%and 10% too high, 29 between 15% and 25% too low, 125 between 10% and 15% too low and 1,028 between 4% and 10% too low. These meters had been in service from 8 to 31 years, and presumably had not been repaired or tested during that time.



CONCRETE PLANT AND QUADRUPLE HOISTING TOWER 350 FEET HIGH.

Hydrant Flow Survey

The 1921 report of the Detroit water board describes a hydrant flow survey covering the entire city which occupied five months of the fiscal year covered by the report.

"The object sought was to determine at all points the amount of water available for fire protection, and to do this the fire hydrants were divided into 1,500 groups of four each, and the amount of water discharged from three hydrants of each group was measured while the residual pressure was observed at a central hydrant. The discharges of the various groups were reduced to a 10-lb. basis; or, in other words, the discharge from each group was computed from the readings taken in the field to determine the amount of water available with a residual pressure of 10 lbs. These readings on the 10-lb. basis were posted on maps and the low areas were determined by inspection and used to determine the lines that should be laid for reinforcing the distribution system.

Engineers' Plans for State Health Boards*

Regulations of the State Boards of Virginia, Washington, West Virginia, Wisconsin, Wyoming, Philippine Islands and Arizona, with respect to the matter and form of plans and reports required to accompany applications for water and sewerage permits

Virginia—Requires one full set of general and detail plans, drawn to scale, white, blue or black line print. "Pencil sketches will not be accepted." Plans shall have the customary titles, points of compass, etc. General plan or layout, detail plans of structures, including purification plants, are called for in wording similar to the regulations of other states. Additional requirements are: "All emergency connections and valves by which water can be turned into the distribution system from any auxiliary or industrial supply shall be shown in detail and locations of each indicated on the general plan." "Detailed designs of filter equipment submitted by filter companies and made part of the plans shall be submitted for approval before construction of the plant begins."

The engineer's report shall contain the principal data upon which the designs were based, especially discussing surface supplies with and without purification and ground water supplies.

Detail specifications covering all the work must be submitted.

Washington—No special regulations as to plans or other information that must accompany application.

West Virginia—Water supply plans, specifications and report required in triplicate. They should include all necessary plans. No special scales or sizes of sheets are required, but should be such that all can be clearly understood and conveniently used; scales of 100 to 300 feet to one inch, and maximum size of 36x48 inches are suggested. The requirements for the engineer's report is a very brief summary of the points found in those of most of the states.

Wisconsin—*Water Works*—A general plan, scale from 100 to 300 feet to the inch, shall show the area of the district served. If the district is too large, it may be divided into sections accompanied by an index map. The general plan shall show all wells, intakes or other sources of supply; the purification plant, if provided; all mains, with their sizes and depths; all valves, hydrants, cross connections, etc., and storage or distribution reservoirs.

Detail plans shall be given of the crib, screens, etc., if water is taken from a stream or lake; if groundwater, details of the development of well, spring, or infiltration gallery, showing definitely the manner of protecting the supply from pollution where there is danger of such. A sketch is required showing all possible sources of pollution within 500 feet and the direction of the underground flow if known. Other plans shall show complete details of purification plant, including tanks, piping system, chemical mixers, rate controllers, etc. Others shall be given of pumping station and equipment, any special features of the distribution system, elevated tanks, reservoirs, etc. Complete specification covering the construction shall be submitted.

The engineer's report must discuss the following subjects: The municipality, community or institution, its population, etc.; the source of supply, including analyses if possible; purification; distribution system; pumping equipment; storage; fire protection. An estimated cost shall be given of developing the source of supply, of the pumping equipment, each unit of the purification plant, the distribution system and any reservoirs; for both the complete system designed and for that which is to be constructed at once.

In connection with these requirements as to plans, the board has prepared a number of requirements as to design, under the general heads of provision for future requirements, protection of source of supply, pumping equipment, purification, by-passes and cross connections, distribution systems, and fire protection.

Sewerage—Regulations as to scale and size of general plans are the same as for water. The general plan shall show the topography; location of any sources of public water supply; location, sizes, grade and direction of flow of each sewer, elevation of invert and depth of cut or street elevation at all manholes; also location of outlets, treatment plants, manholes and all appurtenances, pumping stations, etc.

Detail plans shall show cross sections of all sewers unless made of standard pipes; manholes and other appurtenances; pumping equipment, if required; and map of property to be used for disposal plant with topography and location of the several units, the details of each unit, including elevations of the various parts of the plant and of high and low water levels in the water which will receive the effluent. Complete specifications must accompany the plans.

The engineer's report must discuss the population, water supply of the community, provision for present and future needs as to sewerage, extent of construction now contemplated, character of industrial wastes, the sewer system, type of purification, character of soil, high and normal groundwater level, and estimated cost of each part of the complete system.

These regulations also are accompanied by requirements as to design, such as that provision must be made for at least 25 years in advance, especially as to main sewers. Pumping equipment and sewage treatment plants need be only of sufficient capacity to amply meet present requirements, but with provision for extensions. All new systems must be designed on the separate plan, and in case of existing combined sewers provision shall be made for storm water overflows and in extensions no more storm water shall be admitted to these sewers, and efforts shall be made to convert the system from a combined to a separate system. The sewers are to be laid to the grades which were required in the regulations of Arkansas and many of the other states.

Some of the general requirements as to sewage

*The last of a series of articles begun in the issue of April 8.

treatment plants are as follows: Rates of operation must not exceed a detention period of 8 hours in septic tanks; should be between 2 and 3 hours in Imhoff or similar tanks, which should have a sludge capacity of one cubic foot per capita below a horizontal plane 18 inches below the slot. Intermittent sand filters, not more than 1,000 persons per acre, with a minimum depth of 3 feet. Contact beds, not more than 1,000 persons per acre per foot of depth with a minimum depth of 4 feet. Trickling filters, not more than 3,000 persons per acre per foot of depth with a minimum depth of 5 feet. In sand filters, an effective size not less than .2 mm. nor more than .4 mm. Stone in contact beds, not less than ½-inch nor more than 2 inches; and in trickling filters between ¾-inch and 2½ inches. A competent person shall be put in charge of the operation of every water purification or sewage treatment plant and personally supervise its operation.

Wyoming—So far as we know, no special regulations as to size or nature of plans have been published by the state board.

Philippine Islands—There are neither laws nor requirements governing the preparation of plans for sewerage systems or water supplies in the Philippine Islands. The director of health of the Philippine Health Service, under date of May 24th, stated that the practice being followed was as follows: "Projects concerning these matters originate from district health officers who, with the co-operation of the district sanitary engineers, prepare a report to the director of health. If approved, the report is forwarded to the director of public works for the preparation of plans, details and specifications. When all the plans are finally approved and approriation for the expenses available, the construction is carried out under the supervision of the chief sanitary engineer of this service."

Since publishing a synopsis of the laws requiring submission of plans to state health boards in the issues of April 8th and April 22nd, we have received the following additional information:

Arizona—There is no department of sanitary engineering in this state nor any regulations for sewerage and water supply systems. The Arizona state laboratory co-operates with the various municipalities in an effort to obtain water that will meet the requirements for common carriers established by the U. S. Public Health Service, but can act in only an advisory capacity.

Fire Hazard of Pumps

The National Board of Fire Underwriters considers electric pumps of low reliability because of the danger that the transmission of current to the plant may be interrupted by one of several causes. An illustration of this liability was given in Waltham, Mass., in December, 1921. This happened to be at a sewage pumping station rather than at a water works pumping station, but the illustration is equally pertinent.

The city has one isolated centrifugal pumping plant operated automatically by electricity. This plant during the year pumped about 14,500,000 gallons against a head of 29 feet, using for this purpose 6690 kwh. of which the cost was 7.66 cents per kwh. A severe ice storm resulted in a shutting off of the supply of current and the plant was without electric power for 30 days, during which time it was necessary to keep gasoline pumps constantly in action in order to keep sewage from flooding the low-level section of sewers.

Trees for City Streets

The U. S. Dept. of Agriculture has published a pamphlet of 40 pages containing a great deal of information concerning trees for town and city streets which is presumably reliable and should be in the hands of every official who has charge of or is interested in the shade trees of his community.

Oak trees are considered to be the best trees for street planting. It is thought that the prevalent belief that they are slow growers and the fact that in the north they are rather difficult to transplant are chiefly responsible for the limited use of them. However, a white oak, which is one of the slow growing varieties of oaks, will reach the same height as a sugar maple in the same period of time and maples are one of the most widely used shade trees in the north. The department gives elms second place in desirability for city trees and sycamores third. Most varieties of poplar are not recommended except the lombardy poplar.

Trees native to one part of the United States may not thrive in another part, while some are objectionable in any part either because their roots penetrate open sewer joints, grow so near the surface that they tend to heave and crack sidewalks, or because of other objectionable characteristics.

Trees that thrive in cities must withstand dust and smoke in the atmosphere, unusual and frequently unfavorable soil conditions, restricted feeding areas, interference with the roots occasioned by underground structures, etc. The shape of the top of a full-grown tree should be suited to the width of the street. The foliage should not be too dense and should be of a pleasing texture and color. The resistance of the tree to vegetable and insect pests and diseases is an important consideration. Evergreen trees should be planted only in the most southern parts of the country where there is abundant sunlight in the winter. Desiduous trees that will admit all the light possible should be used in the north.

Narrow streets should be planted with tall slender trees like the lombardy poplar while broad streets may be planted with spreading trees.

For use within reach of ocean spray or on sandy land near the coast, the red oak and the red or scarlet maple are suitable as far south as Charleston, S. C., while the sweet gum and live oak are equally good from Norfolk southward and along the gulf of Mexico. The red oak, sweet gum, red maple and eastern live oak are all grown successfully along the Pacific Oecan, while the California live oak can be used from San Francisco southward.

The trees that best endure the most alkali appear to be the bladdernut tree, the London plane, peppermint gum and hardy fan palms. In the heart of a city the ailanthus will probably thrive when nearly all other trees fail, although the sycamore and London plane are also good for such localities, as are also the Carolina poplars.

The pamphlet can be obtained upon application to the Department of Agriculture at Washington.

A New Method of Rating Water-Bearing Sands and Gravels

By W. G. Kirchoffer*

Methods employed for filter sands are not well adapted to the coarser sand and gravel strata. New method suggested by Prof. Abrams' "Fineness Modulus" for concrete sands.

A knowledge of the size of sand grains and the amount held on each size of a nest of sieves aids greatly in a study of any sand for either artificial filtration of water or sewage, or for a study of the flow of underground waters through a given sand bed.

Many years ago there was devised in the Lawrence experiment station a method for the study of filter sands. This analysis involves the determination of the "Effective Size" and "Uniformity Coefficient." These are found by separating the sand into sizes by a nest of sieves and the platting up of percentages by weight held on each sieve. A curve is drawn through these points and where it cuts the 10% line this is the "Effective Size." This size is such that 10% of the material is of smaller grain and 90% is of larger grains than the given size. The results of the work at Lawrence Experiment Station indicated that the finer 10% have as much influence upon the action of the material in filtration as the coarser 90%. This is explained by the fact that in a mixed material the water is forced to pass through the small interstices made by the finer material. It is this finest portion which mainly determines the loss of head in the sand.

"Uniformity Coefficient" is a term used to designate the ratio of coarse to fine particles, and is the ratio of the size of the material with 60% finer to that size which has 10% finer. These sizes have to be picked from the curve above referred to.

Hazen in describing the above coefficient remarked that further study will likely modify or change the method of calculation. This method of rating sands involves five distinct processes: Sifting, computing percentages, plotting curve, picking off values at 10% and 60% and computing uniformity coefficient.

These factors or coefficients of physical qualities of sands as applied to filter sands are not so well adapted to serve as an index for rating water bearing sands and gravels as they have been found to be for filtration. One of the principal reasons is that the samples from such formations are usually obtained by the use of a churn or hydraulic drilling machine, and no matter how coarse the materials may be, the drill will always make some more fine particles. In any sample of drilling it is easy to find 10% that would pass an 80 or 100 mesh sieve. This would then determine the effective size, although there might be a large percentage of gravel in the sample tested. This fine material, artificially made, would have a double effect on the uniformity coefficient as it would not only influence the effective size, but would also increase the percentage of the volume under 60%.

Another reason is that filter sands are actually screened between relatively close limits as to size, whereas sands and gravels found in the natural state may vary between almost any limits as to size. Two samples of natural sand and gravel might have about the same amount of fine material of the same size, making up the 10% of fine material, but might be totally different in the 90% which would not be revealed by this analysis.

Material used for filters usually remains in place, that is, a very small percent of the fine particles are washed away with the effluent. This, however, is not the case with water bearing sands and gravels when used as a water supply. Many screens are put in wells with the express purpose of removing the fine material by pumping and flushing. Few successful wells have screens less than 60 meshes per inch, except those used in individual supplies. With water supplies, much of the fine material which would make up the percentage of the material used in filtration, would be washed away and not be considered where it was vital. The rating of water bearing sands on the basis of the fine material does not reveal its real characteristics.

I think that those who have had experience in developing water supplies from water bearing sands and gravels will agree with me that material which will pass a 60 mesh sieve is of comparatively little value for this purpose.

When Prof. Abrams of Stevens Institute brought out his "Fineness Modulus" for rating sands and gravels for concrete work, it gave me a suggestion that a similar factor might be worked out on water bearing sands and gravels. During the last 15 years I have analyzed a number of sands and gravels for water supply purposes, and for a number of years used the "Effective Size" and "Uniformity Coefficient" as an index to the relative value of the material for water supply purposes. The records of the sieve analyses have been preserved and are now available for comparative purposes by the new method that is about to be explained.

My set of sieves did not correspond exactly with Abrams, but for my purpose this was not necessary. My sieves are 4, 10, 20, 30, 40 and 60 meshes per inch. To determine the fineness modulus with this set of sieves it is only necessary to add together the total percentages by weight that are held on each sieve. The sixty mesh sieve would, of course, hold its own portion and all that which is held on the larger sieves up to and including No. 4. Likewise the 40 sieve would hold its own and all that on the large sieves. The determination of the fineness modulus for a sand from Stevens Point, Wisconsin, is given in Table No. 1.

From this table it is seen that for this particular set of sieves the fineness modulus is made up of 6 times the percentage held on sieve No. 4, five times that held on sieve No. 10, four times that on No. 20 and so on down to once on No. 60.

Another way of stating it would be that the gravel

* Sanitary and hydraulic engineer.

Table No. 1	Percent by weight held on each Sieve							
	No. 4	No. 10	No. 20	No. 30	No. 40	No. 60	No. 60 Passed	Total percentage held on each
60	4.4	9.94	6.16	12.00	30.20	29.90	7.60	92.60
40	4.4	9.94	6.16	12.00	30.20	....	....	62.70
30	4.4	9.94	6.16	12.00	....	....	....	32.50
20	4.4	9.94	6.16	....	....	....	....	20.50
10	4.4	9.94	....	....	....	....	....	14.34
4	4.4	....	....	....	....	....	....	4.40
Fineness Modulus								227.04

held on No. 4 sieve is given relative weight of six, that on No. 10 a weight of five and so on to a weight of one for No. 60. All material passing No. 60 is discarded. If a larger portion passes No. 60 the part remaining on the sieves is likewise less and thus the fineness modulus is indirectly effected by it.

With this method it would be impossible to get a fineness modulus greater than 600 even if all of the material was held on a No. 4 sieve, but it might be as low as zero if all of the material passed a 60-mesh sieve. If it was all held on a 60-mesh, but passed the 40-mesh, the fineness modulus would be only 100. If it was all held on a No. 40 mesh the fineness modulus would be 200. If held on No. 30, 300; No. 20, 400; No. 10, 500, etc.

Any composite sand having a fineness modulus of 200 or thereabout, might for comparative purposes, be considered as one held on a No. 40 mesh sieve.

While these indices may not be theoretically correct for the permeability of sands assorted in this way, yet it is rating them in a relatively correct manner. That is to say, the coarser the sand and the more gravel there is, the greater will be the flow through a material under the same conditions.

After having settled on this method for an index, I went back to some of my records of sands and gravels where I had developed a satisfactory supply and previously used the "Effective Size" method and determined the fineness modulus for that supply as follows:

Antigo	267
Tomahawk	213
Medford	303
Marshfield	198
Shawano	253
Wisconsin Rapids	139
Stevens Point	271
Nekoosa-Edwards P. C.	298
Delavan	362
Marathon Paper Co.	388

From actual experience with these supplies I have been able to draw the following conclusions in a general way. Where the fineness modulus is 100 or less the sand and gravel is of little value as a water supply or we could rate it as *very poor.;* 100 to 140 poor, 140 to 200 fair, 200 to 250 good, 250 to 300 very good and over 300 excellent. This sort of an analysis determines conclusively a total figure for fineness modulus, but it does not show at a glance just how this fineness modulus was made up; that is, two good sands might vary greatly in the percentage held on No. 4, No. 10, and No. 20 and still have about the same high fineness modulus.

I have, therefore, prepared a chart showing the weighted percentages held on each size, beginning with No. 4 and accumulating the weighted percentages until the 60 size is reached. Curves for several sands analyzed in this way are shown in Fig. 1. It will be noted that nearly all of the curves have the same general form. This chart shows also some analyses made on proposed supplies that have not been developed and some poor material encountered at Stevens Point and Waupaca.

All of the samples taken from formations that are continuously sand and gravel from top to bottom have the reverse or ogee type of curve. Those from formations that alternate with layers of clay and sand have curves convex upwards as Marshfield, Medford and Delavan. It will also be noted that the

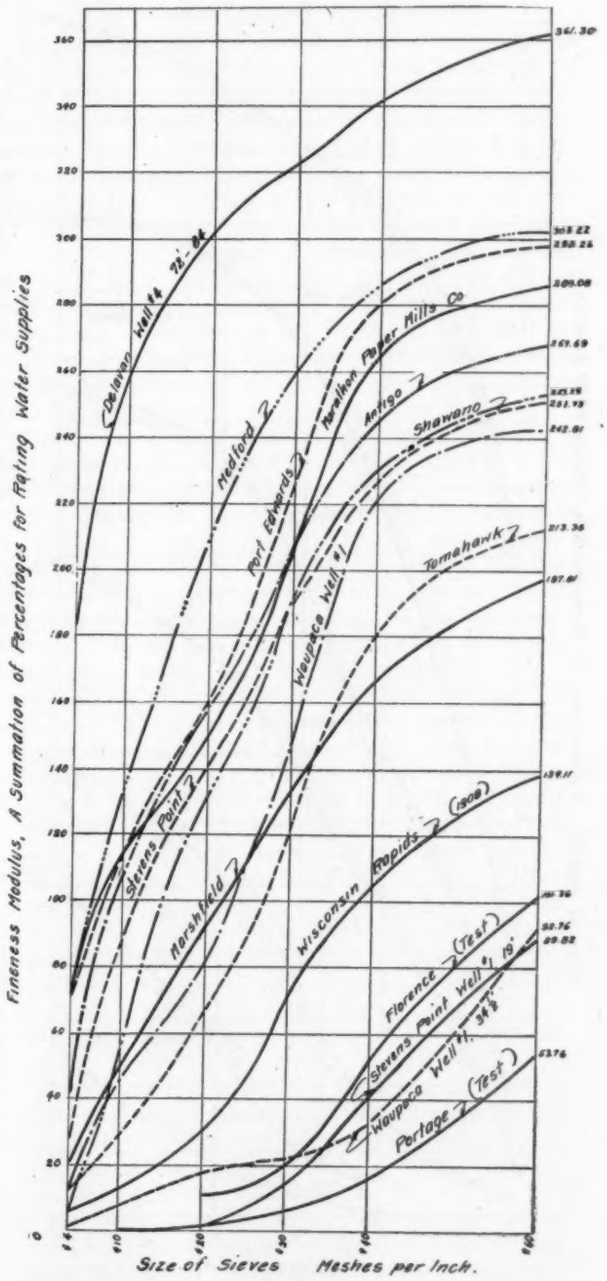


CHART SHOWING FINENESS MODULUS BY SIEVE ANALYSIS OF WATER-BEARING SANDS AND GRAVELS.

ones of the highest modulus have flat curves in their upper portion. This tells to the eye at once that the amount of fine material present is very small, whereas those of low moduli as Wisconsin Rapids, Portage, etc., have steep curves in their upper portions.

The material from Delavan is remarkably peculiar. It is a material made up almost entirely of Trenton limestone chips. It has been worked over by the ice and water very little as there are few rounded grains. This perhaps accounts for the high modulus.

The Wisconsin Rapids' supply was developed before this method of rating was devised. It has not proven very satisfactory, therefore, any sand and gravel having a fineness modulus below this is rated as very poor and is not used where other sources are available.

The Portage sample was borrowed from Mr. Tannant, City Engineer, who was having test wells put down. I understand a well concern in the South proposes to develop a supply in this material. From my way of thinking they will be disappointed.

For convenience in the study of any proposed supply I have prepared a chart shown in Fig. 2. This has been prepared by taking averages of the different grades of sands shown in Fig. 1 and noting the separation in grades given above as very poor, poor, fair, etc. One or more of these charts can be used for each study and when a final conclusion is reached the resulting curve can be plotted on Fig. 1 for exact comparison with the supplies previously developed.

This method is simple, can be easily applied by any office assistant after a little practice. It is much easier to work out than the size of the sand grains in millimeters and when once done means much more to the investigator.

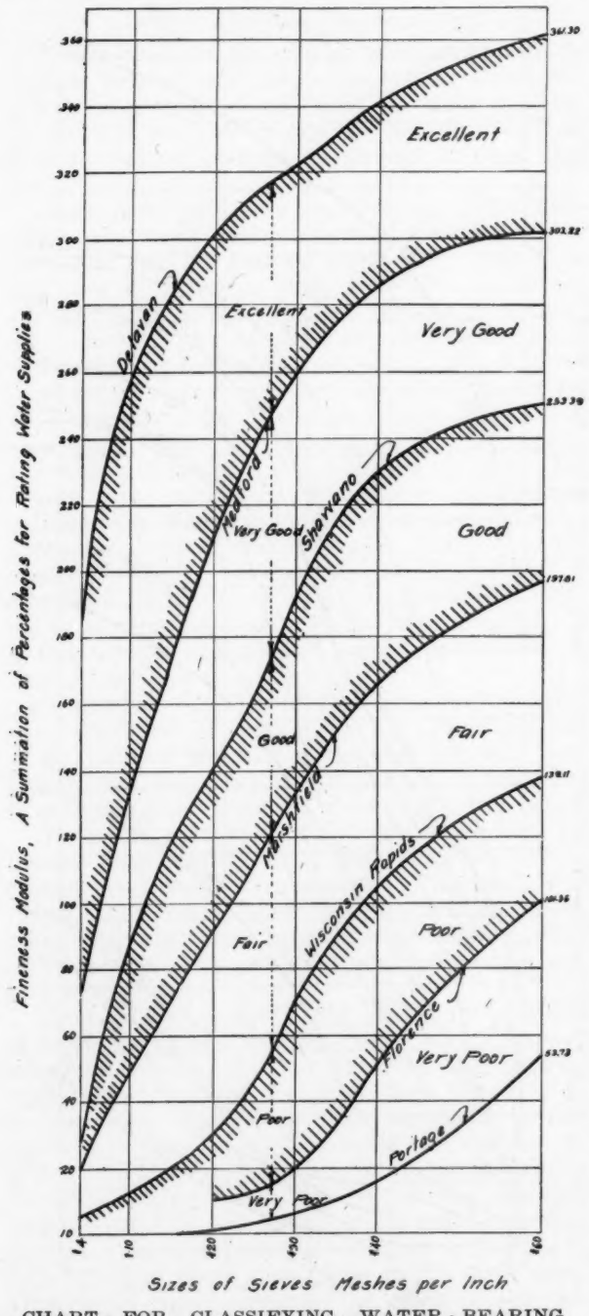


CHART FOR CLASSIFYING WATER-BEARING SANDS AND GRAVELS BY SIEVE ANALYSIS.

Contract for Buffalo's Filter Plant

Bids were received on July 11th for the concrete substructure for the filter plant at Buffalo, N. Y., four bids having been received, from the John Johnson Construction Co. and the Buffalo Dredging Co., both of Buffalo, from A. Bentley & Sons Co., of Toledo, and from the Thompson-Starrett Co. of New York.

The work included excavation of earth and rock, construction of a cofferdam and, in the structure itself, reinforced concrete with copper expansion joints and several tons of cast iron pipe and iron and steel work. The largest quantities in the estimate were 360,000 cubic yards of general earth excavation, 20,000 cubic yards of earth excavation for conduits, 7,000 cubic yards of rock excavation, 110,000 cubic yards of earth embankment, 55,000 cubic yards of concrete masonry and 3,500 tons of steel reinforcement.

Two separate estimates of cost had been made, one by the water commissioner, George C. Andrews and the other by the consulting engineer, Harrison P. Eddy; the former having estimated the total cost at $2,085,150 and the latter at $2,097,200. Mr. Andrews' estimates were based on common labor at 40 cents an hour, cement at $2.26 net per barrel, gravel and sand at $1.60 net per yard delivered by trucks, lumber at $45 per thousand, coal at $5 per ton, electric power at 1½ cents per kwh., and reinforcement steel at $40 per ton; with an estimate of $200,000 as the capital requirement for conducting the work.

Estimates and bids for some of the largest quantities were as follows: General earth excavation, estimates $1.25 and $1.40; bids 60 cents, 93 cents, 94 cents and $1.50. Earth embankment, estimates 25 cents and 75 cents; bids 25 cents, 48 cents, 50 cents and 56 cents. Concrete masonry, estimates $20 and $17.50; bids $16.00, $16.00, $18.75 and $20.00. Steel reinforcement, estimates $85 per ton and $100; bids $68.45, $70, $74.50 and $90.

The totals of the four bids were as follows: $1,800,480, $1,801,765, $2,014,275, and $2,126,400.

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CONTENTS

RESURFACING OLD PAVEMENTS..... 55
HETCH HETCHY DAM CONCRETE PLANT. Illustrated 58
Steel Distribution Mains in Detroit..... 60
Accuracy of Old Meters..... 61
Hydrant Flow Survey..... 61
ENGINEERS' PLANS FOR STATE HEALTH BOARDS 62
Fire Hazard of Pumps..... 63
Trees for City Streets..... 63
A NEW METHOD OF RATING WATER-BEARING SANDS AND GRAVELS. Illustrated. By W. G. Kirchoffer..... 64
Contract for Buffalo's Filter Plant..... 66
EDITORIAL NOTES 67
Plans for Sewer and Water Works Systems—Construction Economics.
Cambridge Water Works Notes..... 68
Wear of Concrete..... 68
Extensive Highway Work in Florida..... 68
WATER WORKS SERVICES. Tables..... 69
Automobiles Break Hydrants..... 73
RECENT LEGAL DECISIONS..... 74

Plans for Sewerage and Water Works Systems

We conclude this week the series of articles that we have been publishing under the heading "Engineers' Plans for State Health Boards," in which we have given synopses of the legal requirements of the several states as to submission of plans for sewerage or water works systems to their state health boards and the rules of the boards specifying size, scale, etc., and contents of such plans and reports.

In a few states the boards of health have been organized only a few months and have not yet prepared regulations of this kind, although expecting to do so. In other states no power is given to the boards of health to require that plans be submitted to them, but several have induced the engineers generally to voluntarily submit such plans to them.

In the majority of states, however, the state boards have the power to require plans of this kind and the most of them have prepared rules and regulations specifying what information must be given and in what form. Of these last, a considerable number have adopted regulations that vary from each other in only minor details, among these being Arkansas, California, Georgia, Iowa, Louisiana, Montana, New Jersey, North Dakota, Oklahoma and Texas; while a few others do not differ from these in the essentials of their regulations.

On the other hand, two or three of the state boards express the opinion that it is undesirable to specify too exactly as to the plans to be sumbitted, especially the size and scale, since these might conflict with the standards adopted in the offices of the various engineers. Whether or not the rather minute details found in some of the regulations are desirable as essential requirements, they are at least of value to the younger engineers in indicating to them what plans, reports, etc., are considered essential for a complete design and what scales and dimensions are considered to be most suitable for maps and other drawings.

Construction Economics

Engineering skill of a high order is necessary for the design and construction of a great water supply plant especially when it comprises unusually large and costly features like those of the Hetch Hetchy system described in this and previous issues. The best technical results are not, however, limited to safety, durability and efficiency of the permanent structure. To obtain the highest success the engineer must also provide for rapidity, safety, minimum cost and simplicity of construction and plan to utilize to the utmost the potential elements of the temporary operations, thus exemplifying the fundamental definition of the civil engineer—"One who best utilizes natural forces and materials for human welfare, construction and operations."

Ability of a high order has been displayed by the engineers and builders of the new San Francisco water supply system, in the construction of which several important features stand out prominently in making the work easier, cheaper and quicker. Several million dollars were wisely spent at the outset in auxiliary construction of a temporary nature, including the building of a long line of railroad, highway construction, and the installation of a complete and powerful hydro-electric plant to furnish a very large proportion of all the power needed for mechanical operations in the heaviest, most difficult and remote parts of the construction. The dry season water supply for the hydro-electric plant is impounded by a concrete arch dam that will eventually be enlarged for the construction of a permanent reservoir for a portion of the regular city water supply.

The construction of the Hetch Hetchy dam, which will be one of the largest in the world, has been planned in two successive operations, the second of which will involve a large fraction of the total minimum cost and may be several years delayed so as to eliminate a very important interest charge, and avoid heavy expenditures under the inflated prices prevailing when the work was commenced. The first portion of the dam is so designed as to be a complete and independent structure affording abundant service for a number of years and designed to be enlarged without extra expense or any change of plans under the given requirements.

In addition to these primary economics, important advances have been secured by the contractor by installing a number of construction plants in harmony with geographical conditions and in such a manner as to minimize hand labor, provide a normal storage

of materials sufficient to safeguard against any probable delays or interruptions, and to secure rapid, efficient and continuous deliveries of them from storage to the dam site and their distribution to the different parts of the structure by standard methods of recognized efficiency. Part of the work could have been executed without some of the heavy initial expenditures, but the total cost and delay would have been increased and the contractor's profits would have been greatly reduced by such omissions.

Cambridge Water Works Notes

The following items of interest appeared in the 1921 report of the water board of Cambridge, Mass., of which Walter H. Harding is registrar and Timothy W. Good is superintendent.

In preparing for the operation of the proposed filtration plant, plans for which had been prepared by George A. Johnson, the water board has for several years past been cleaning the mains of the distribution system so that the filtered water will not be again contaminated by deposits in the pipes. Over 7 miles of mains had been cleaned in the year covered by the report and 23.7 miles in the previous five years, this including all the large feeders of the system.

The city at the time of the report had 59 "Detector" and "Protectus" meters on fire supply lines, 4 of these being 8-inch, 8 of them 4-inch, 5 3-inch and the remainder 6-inch. In addition to these there were 14 large meters on fire supply lines. In addition to these 73 metered fire supply lines, there were 178 large supply lines unmetered. The majority of these were 6-inch, but there were 8 8-inch, 44 4-inch, 1 3-inch, 11 2-inch and 3 1½-inch fire services. In a number of cases two or more large services were laid into a single plant, one company having an 8-inch and a 6-inch service in each of two plants, another a 4-inch and 6-inch in one plant.

In addition to the meters on fire supplies there were 6,762 meters on other supplies, most of these being ⅝-inch and ¾-inch, although about 100 were of sizes up to 6 inches. Seventy meters were on school houses and other public buildings.

Under the head of pumping stations, Superintendent Good reported: "The installation of the Payne Dean electric controls has been a great factor in the working of our three large gates which we had equipped this year. The value of these electric devices is so great that I hope that the board will consider placing them on our other large gates as soon as possible."

Wear of Concrete

There has recently been published a report by Duff A. Abrams, professor in charge of the Structural Materials Research Laboratory of Lewis Institute, giving the details of tests carried out by the laboratory to determine how the wearing qualities of concrete are affected by the character of the ingredients, quantity of mixing water, time of mixing, age of concrete and other conditions. About 10,000 blocks were tested for wear and several thousand compression cylinders and miscellaneous specimens. The amount of wear was measured by the thickness of concrete removed by the test. In making the test the Talbot-Jones rattler was used. In this was placed a ring of 10 separately molded concrete blocks 8 inches square and 5 inches thick, fastened as a lining around the circumference of the rattler. The surfaces of the blocks were subjected to the tumbling action of a 200-pound charge of cast iron balls for 1800 revolutions, which were made in about one hour. In most of the tests blocks were used which had been stored for 14 days in damp sand or moist air and 76 days in air at ordinary humidity.

After describing the tests in considerable detail, the report gives the following conclusions:

(1) The wear on separately molded concrete blocks tested in the Talbot-Jones rattler was much more severe than any encountered in service; however, the test is believed to give trustworthy information on the wearing resistance of concrete of various proportions, consistencies, curing conditions, ages, etc., for use in concrete roads and pavements.

(2) A standarized practice must be followed in making the specimens and conducting the tests if consistent and reliable data are to be secured.

(3) In general the factors which gave concrete of high strength also gave concrete of low wear (a high *resistance to wear*).

(4) Increasing the quantity of cement reduced the wear.

(5) Increasing the quantity of mixing water, beyond the minimum required to produce a plastic concrete, caused a material increase in the wear.

(6) The coarser the grading of the aggregates, up to certain limits, the lower the wear.

(7) Curing concrete under favorable conditions exerted a marked influence in reducing wear.

(8) Wear was materially reduced by longer mixing of the concrete.

(9) Wear was reduced (resistance to wear increased) with the age of the concrete.

(10) The quality of the fine or coarse aggregate produced less effect on wear than is commonly supposed. The wearing resistance of concrete is determined largely by the *quality of concrete* rather than by the type of aggregate. Good concrete can be produced from aggregates which are generally considered inferior, if other factors are properly taken into account.

(11) The wear of concrete was not sensibly increased by the presence of hydrated lime or other powdered admixtures up to 20 per cent. of the volume of cement.

Extensive Highway Work in Florida

Florida stands well up with the largest states of the country this year in the amount of highway work that it is doing or contracting for. A recent illustration of this is a letting on July 5th by Pinellas county, when contracts aggregating nearly $2,250,000 were let for work in that one county. This included about 600,000 square yards of vitrified brick on a base of compacted rock 5 inches thick and with a 6 by 15-inch concrete curb; also about 400,000 yards of 2½-inch sheet asphalt on a 6-inch base of compacted rock, together with $108,000 worth of reinforced concrete bridges. The contract price for the vitrified brick was $1,301,854 and that for the sheet asphalt was $804,785.

Water Works Service

Continuation from the July 15th issue, of tables prepared from data furnished by superintendents of nearly eight hundred cities.

Municipality.	Private (P.) or municipal (M) plant.	Services laid preparatory to paving, before needed for use. Are they required by city?	Kind of pipe specified.	Depth specified.	Trouble experienced with them after laying.
Mississippi:					
Charleston	M.	yes	½" up	2 ft.	none
Tupelo	M.	no	....	3 ft.	none
Missouri:					
Chillicothe	M.	no	no spec.	no spec.	occasionally freeze
Fulton	M.	no	...	...	.....
Montana:					
Bozeman	M.	yes	l.	5 ft.	none
Havre	M.	no pav.	l.	6 ft.	none
Kalispell	...	to prop. line	l.	4' 6"	none
Lewistown	M.	no	l.	5 ft.	.....
New Hampshire:					
Newport	M.	no	...	...	.....
New Jersey					
West Orange	P.	yes	gwi.	4 ft.	none
New Mexico:					
Deming	M.	no pav.	...	...	.....
Tucumcari	M.	no	gs.	2 ft.	none
New York:					
Little Falls	M.	yes	l.	5 ft.	none
Medina	M.	yes	l.	3½ ft.	none
Oneida	M.	yes	l.	5 ft.	none
Owego	P.	yes	...	4½-5 ft.	none
Potsdam	M.	yes	gs. or l.	5 ft.	gooseneck burst
Tonawanda	M.	yes	l. ⅝"	4 ft.	none
Whitehall	M.	no	l.	4 ft.	careless plumbing, supporting & shallow laying
North Carolina:					
Concord	M.	yes	no spec.	2 ft.	none
Elizabeth City	P.	optional with co.	¾" i.	18 in.	.....
Henderson	P.	yes	¾" gs.	24 in.	clogging if unused
Kinston	M.	yes	g.	24 in.	gooseneck breaks sometimes near corp. cock
Washington	...	yes	¾" g	18 in.	none
North Dakota:					
Bismarck	P.	no	l.	7' 6"	none
Mandan	M.	yes	l.	7 ft.	none
Minot	M.	yes	¾", 1" l.	8 ft.	.....
Ohio:					
Bellevue	M.	no	...	3-4 ft.	sometimes freezing
Bowling Green	P.	yes	l.	4 ft.	.....
Celina	M.	yes	l.	3½ ft.	none
Conneaut	M.	yes	g.	4½ ft.	none
Delaware	P.	yes	no spec.	3½ ft.	none
Dennison	P.	yes	½" l.	4 ft.	none
Greenville	M.	yes	l.	4 ft.	electrolysis only
Leetonia	M.	yes	l. at main gwi. to curb	...	none
Logan	M.	yes	¾"—1"	3 ft.	none
Marietta	M.	yes	g. or l.	3 ft.	practically none
Middleport	P.	no	...	3 ft.	.....
Oberlin	M.	yes	l.	5 ft.	none
Ravenna	M.	yes	¾" g.	4 ft.	service to curb have given considerable trouble, average life 8 yrs.
South Carolina:					
Chester	M.	...	gl., l. connections	no spec.	none
Sumter	M.	yes	g. pipe, l. to main	2 ft.	very little
South Dakota:					
Rapid City	M.	yes	l.	5 ft.	none
Watertown	M.	yes	l.	7 ft.	none
Yankton	M.	yes	l.	5 ft.	none
Tennessee:					
Clarksville	M.	yes	l.	2½ ft.	none
Covington	...	yes	l.	...	none
Dyersburg	M.	yes	l.	24 in.	none
Fayetteville	M.	yes	g., l. goosenecks	18 in.	small leaks in gooseneck
Jackson	M.	no	l.	2½ ft.	very little
Johnson City	M.	yes	g.	18 in. or 2 ft.	.....
Texas:					
Bryan	M.	usually not	l.	12-18 in.	.....
Childress	M.	yes	...	16 in.	none
Clarksville	M.	yes	l.	12 in.	none
Corpus Christi	...	no	l.	30 in.	iron rust out in 15-20 years
Del Rio	M.	no	...	...	.....
Eastland	M.	yes	l.	18 in.	none
Galveston	M.	no	separate 2" tap at each corner of st.	18 in.	giving out—old
Georgetown	M.	yes	black pipe, l. gooseneck	2 ft.	none
Gonzales	P.	no	½" taps for residence	no spec.	.....
Gorman	M.	no	none	30 in.	none
Greenville	M.	yes	l.	...	none
Longview	M.	yes	l.	3 ft.	.....
McKinney	M.	yes	l.	18 in.	scale over ½", services not in use
Navasota	P.	no	...	18 in.	.....
Orange	P.	yes	l.	18 in.	.....
Weatherford	P.	no	...	18 in.	little trouble
Utah:					
Brigham	M.	yes	g.	4 ft.	none
Vermont:					
Bennington	M.	yes	l.	5 ft.	frost
Brattleboro	P.	no	...	5 ft.	.....
Washington:					
Aberdeen	M.	no	...	...	settlement of pavt. breaking services
Anacortes	M.	yes	g.	20 in.	none
Auburn	M.	no	...	...	.....
Bellingham	M.	no	no. spec.	24-42 in.	.....
Cle Elum	M.	no pav.	...	...	.....
Dayton	M.	yes	g.	24 in.	none
Ellensburg	M.	...	...	...	.....
Hoquiam	P.	no	...	2 ft.	none from frost
Port Angeles	P.	yes	...	24 in.	none
Snohomish	M.	lay to curb	g.	2 ft.	.....
Tacoma	M.	no	...	24 in.	.....
Walla Walla	M.	no	...	2 ft.	those not in use deteriorate quickly

Table II—Water Works Services

Note: In the table, ci. means cast iron; ci., cement lined; gi., galvanized iron; gs., galvanized steel; gwi., galvanized wrought iron; i., iron; li., lead lined; s., steel; wi., wrought iron.

Municipality	Materials used for services	Average life before renewal years	Cause of deterioration	Clogging of service pipes: Does it occur?	Clogging of service pipes: Method of removal
Arizona:					
Clifton	s.	2-20	corrosion by acidity from copper ore mill tailings used in surf. sts.	no	.....
Douglas	l. under pavt. s., earth	gs. 15	rust, elect., sediment	yes	renew
Glendale	gwi., l. large goosenecks	15-20	rust	no	.....
Nogales	gs.	15	rust	no	.....
Prescott	wi.	18	rust	no	.....
Tucson	l. under pavt. gi. otherwise	g. 20	rust	no	.....
Arkansas:					
Helena	l.	g. 15, black pipe 10	action of cinders and rust	no	.....
Russelville	g.	12+	.....	no	.....
California:					
Anaheim	g.	20	rust	sediment	flushing
Benicia	l. under pavt. wi. otherwise	.....	rust	no	.....
Burbank	wi., s.	wi. 35, s. 15	rust	no	.....
Calexico	wi.	8	destruction by soil	no	.....
Daly City	g., wi.	20	.....	no	.....
Dinuba	s.	13+	.....	no	.....
El Centro	l. serv.	.....	rust from alkali	no	.....
Fort Bragg	wood	25	.....	.....	.....
Fullerton	l. on g.	8-20	elect.	no	.....
Monterey and 3 others	g.	20-25	rust	small pipes	renew
National City	wi.	10-30	rust from alkali	sometimes with meter	clean meter
Needles	wi.	5	rust	no	.....
Oxnard	wi.	20	rust	no	.....
Palo Alto	s., wi.	10-20	rust	no	.....
Red Bluff	g., wi.	40+	rust on outside	no	.....
Redding	s., ci.	s. 20, ci. 50+	rust of steel pipe	no	.....
Salinas	wi.	15	rust	yes, from sand	opening main and flushing
San Fernando	s.	.....	.....	no	.....
Santa Maria	ci., wi., s.	25	hardness of water	tuberculation	removal
Santa Paula	s., wi.	15-25	liming up	yes	renewal
So. Pasadena	g.	.....	.....	no	.....

Municipality.	(P) or municipal (M) plant.	Services laid preparatory to paving, before needed for use. Are they required by city?	Kind of pipe specified.	Depth specified.	Trouble experienced with them after laying.
Saline ville	M.	yes	l.	2 ft.	Clog by being kinked
Shelby	P.	yes	l.	4 ft.	none
Struthers	P.	yes	⅝ x ½ ferrule l. to curb box	4 ft.	due to careless work
Toronto	M.	yes	l.	42 in.	.....
Troy	M.	yes	l.	4 ft.	none
Urbana	M.	yes	l.	3½ ft.	none
Wapakoneta	M.	yes	l.	42 in.	none
Wauseon	M.	yes	l.	3' 6"	none
Wilmington	P.	yes	l.	3 ft.	none
Oklahoma:					
Blackwell	M.	no	...	22 in.	none
Clinton	M.	yes	l.	3 ft.	none
Commerce	M.	yes	l.	24 in.	none
Durant	M.	yes	l.	24 in.	none
El Reno	M.	yes	l.	15-30 in.	none
Guthrie	M.	yes	l.	18 in.	none
Henryetta	M.	yes	l.	30 in.	none
Hominy	M.	yes	l.	20 in.	none
Madill	M.	yes	l.	36 in.	none
Miami	M.	yes	wi.	30 in.	none
Norman	M.	yes	¾" l.	18 in.	none
Oklahoma City	M.	yes	l.	24 in.	none
Okmulgee	M.	yes	l.	24 in.	none
Sapulpa	M.	yes	l. or wi.	18 in.	few l. burst, some service rusted out
Oregon:					
Eugene	M.	no	...	30 in.	Clogging with rust
Grants Pass	P.	no	...	...	.....
Hood River	M.	yes	g.	30 in.	none
La Grande	M.	no	...	...	.....
Marshfield	P.	no	...	...	.....
North Bend					
Roseburg	P.	no	...	18 in.	.....
Pennsylvania:					
Ambler	P.	no	...	3 ft.	.....
Beaver	P.	yes	l.	3-4 ft.	wiped joints leak
Bradford	M.	yes	l.	3½ ft.	none
Clearfield	P.	no	...	...	.....
Elizabethtown	P.	no	...	3½ ft.	.....
Knoxville	M.	yes	wi.	4 ft.	.....
Lebanon	M.	no	l.	3 ft.	none
Parkesburg	P.	yes	none	3 ft.	.....
Rankin	distributing	no	...	...	none
Ridgway	M.	yes	wi.	4 ft.	.....
Sewickley	M.	no	l.	4 ft.	break if laid on sour ditch
Tarentum	M.	no	...	4 ft.	none
Waynesboro	P.	no	...	below freez.	.....
West Newton	P.	no	none	3 ft.	none
Rhode Island:					
Narragansett	P.	no	none	5 ft.	very little
Wakefield					
Peace Dale					
Phoenix	P.	no	...	...	rust, causing leaks
Providence	M.	no	...	...	.....

Table II—Water Works Services—(Continued)

Municipality	Materials used for services	Average life before renewal years	Cause of deterioration	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal
Colorado:					
Brighton	i.	.....	.....	no	.....
Delta	wi.	15	alkali	no	.....
Denver	l.	40	erosion, corrosion, expansion of pipe	yes	pumping
Montrose	g. and l.	i. 15	alkaline soil	no	.....
Sterling	l. now	wi. 10-12	rust	no	.....
Connecticut:					
New Britain	g., wi., l. corp.	20	.....	no	.....
New London	brass, l., gi., ll	g. 12	elect., rust, soil action	yes	force pump
Florida:					
De Land	s., wi.	15	rust	.....	.....
Fort Myers	l., wi.	wi. 8-12	rust	some	.....
Lakeland	g.	.....	.....	seldom	remove joint, dry, rap on it
Quincy	wi.	20	breaking and tearing up	no	.....
Georgia:					
Cedartown	wi.	6-20	rust	no	.....
Newnan	s.	12-15	pitting and rust	no	.....
Idaho:					
Blackfoot	gi.	.....	.....	.....	.....
Burley	redwood and fir	.....	dry rot	some roots from trees	take out corp.
Caldwell	g.	.....	.....	.....	.....
Coeur d'Alene	g.	20	rust	no	.....
Lewiston	g. wi., l. goose-necks	30 g.-15 black	rust	.....	.....
Montpelier	g. wi.	15+	.....	no	.....
Preston	g., l. gooseneck	10+	.....	no	.....
Weiser	g., l. under pav.	g. 15-20	rust from alkali in soil	no	.....
Illinois:					
Hinsdale	l.	.....	old wiped joints breaking elect. in cl.	some at gooseneck	cleaned, with acid or new serv.
White Hall	l.	25+	.....	no	.....
Indiana:					
Franklin	wi.	18	elect., rust	very little	.....
Portland	l.	indef.	.....	some	air compressor and tank
Princeton	g.	15-20	rust, sediment	not much	.....
Richmond	l.	.....	elect.	no	.....
Rushville	ll.	20	rust	yes	renew
Seymour	wi. and l.	.....	.....	no	.....
Shelbyville	gs.	.....	none	no	.....
Iowa:					
Albia	l. and i.	.....	2 cases of elect.	.....	.....
Cedar Falls	wi.	.....	rust	no	.....
Charles City	l.	.....	.....	iron rust	flush hydrants
Cherokee	l., g.	.....	no elect.	no	.....
Nevada	l.	g. 8-20	elect. in loam, rust in clay soil	2 or 3 cases	renew
Newton	l., g.	g. 8-10	rust	no	.....
Oskaloosa	l. and s.	s. 12-20 wi. 20, l. 100	action of soil	.....	blow offs
Winterset	s.	gs. 14	rust	no	.....
Kansas:					
Augusta	wi. and l.	wi. 10	corrosion	no	.....
Baxter Springs	g. and l.	g. 20	rust	no	.....
Concordia	wi.	s. 20, wi. 25	1% or less	no	.....
Council Grove	s., wi.	s. 10-25	rust or corrosion	no	.....
Holton	wi., l.	wi. 10	rust	no	.....
Junction City	wi., l.	wi. 25	elect.; rust	no	.....
Manhattan	l. and wi.	.....	elect.	.....	.....
Pratt	s., l. under pav.	s. 7-15, l. 30-40	none	no	.....
Kentucky:					
Georgetown	g.	25	corrosion	no	.....
Hickman	s., wi.	7	rust	yes	renew or bore out with machine
Hopkinsville	g., l.	g. 30	rust	no	.....
Maysville	wi., l.	25-35	none	sometimes	.....
Paris	gs., wi.	20-25	.....	no	.....
Maine:					
Calais	wi.	30	elect., rust	some	pressure pump
Gardiner	wi.	15-20	rust	no	.....
Rockland	g., wi.	25	rust	yes	wiring
Rumford	g., wi.	12	rust	yes	cleaning rods
Maryland:					
Baltimore	ll. wi.	20	elect., rust	no	.....
Massachusetts:					
Adams	g.	30-50	rust	no	.....
Dalton	wi.	35+	none	no	.....
Falmouth	g., wi.	15	rust	yes	.....
Fitchburg	wi., cl.	50	rust	.....	run pipe inside
Lynn	wi., cl.	20-40	rust	no	.....
Millbury	cl., s.	.....	.....	no	.....
Shrewsbury	cl.	.....	.....	.....	.....
Michigan:					
Coldwater	l.	20+	.....	some	with water ram
Grand Rapids	l.	.....	.....	.....	.....
Hancock	ci.	.....	none	no	.....
Iron Mountain	wi.	wi. 30, s. 5	rust	.....	.....
Royal Oak	g., wi.	.....	.....	seldom	flush back into main with pressure pump
St. Joseph	g. wi., l gooseneck	.....	elect.	no	.....

Table II—Water Works Services—(Continued)

Municipality	Materials used for services	Average life before renewal years	Cause of deterioration	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal
Minnesota:					
Alexandria	l., i.	.....	rust	very little	.....
Fairmont	l.	.....	.....	.....	.....
Litchfield	g.	.....	.....	.....	no
Moorhead	l.	.....	elect.	few cases	run wire cable through pipe
New Ulm	l.	.....	.....	no	.....
St. Peter	s. and l.	s. 15-20	rust	no	.....
Mississippi:					
Charleston	wi., l. goosenecks	10	rust	no	.....
Tupelo	g.	20	.....	no	.....
Missouri:					
Chillicothe	s., l.	2-25	Corrosion and pitting	some	.....
Fulton	l. to curb box, s. or wi.	s. 15	rust	no	.....
Montana:					
Bozeman	g. wi., l.	g. 20	rust	no	.....
Havre	l.	g. 10	rust, splitting of pipe on seam	no	.....
Kalispell	l., g.	l. 50, g. 20	rust and corrosion	no	.....
Lewistown	l., g.	g. 8-12	rust and corrosion	no	.....
New Hampshire:					
Newport	cl.	25-35	rust	no	.....
New Jersey:					
West Orange	l., g. wi.	wi. 15, l. 25+	elect.; wi., inward corrosion	only in small pipes	renewal
New Mexico:					
Deming	gs.	15	rust	yes	renew
Tucumcari	gs.	15	rust	no	.....
New York:					
Little Falls	l.	35+	.....	no	.....
Medina	l. and s.	s. 15	rust	no	.....
Oneida	l.	indef.	none	no	.....
Owego	wi.	30	rust and filling up with inside deposits	.....	.....
Potsdam	s.	15-20	elect.	yes	force pump
Tonawanda	l.	.....	.....	.....	.....
Whitehall	g. wi.	wi. 10	rust and nature of soil	yes	flushing
North Carolina:					
Concord	wi.	15+	rust	some	renew
Elizabeth City	wi.	12-15	rust and settling from old filters	.....	.....
Henderson	s.	15	.....	some	usually renew
Kinston	g. wi.	30	rust	no	.....
Washington	g.	20	rust	no	.....
North Dakota:					
Bismarck	l.	g. 15-30	rust	no	.....
Mandan	l.	g. 3-7	none from l.	no	.....
Minot	l., cl.	.....	.....	no	.....
Ohio:					
Bellevue	wi.	15-25	mostly corrosion	no	.....
Bowling Green	l., s.	s. 15	elect. l., rust and elect. s.	no	.....
Celina	l.	indef.	.....	yes	air tank
Conneaut	g.	20	rust	no	.....
Delaware	wi.	20	rust	no	.....
Dennison	l.	.....	.....	no	.....
Greenville	l.	30	elect.	yes	dig up and clean ferrules
Leetonia	l. at main and g. wi. to curb	.....	.....	.....	.....
Logan	g.	.....	rust	yes	blow them
Marietta	g.	20-25	corrosion and rust mostly	no	.....
Middleport	wi.	.....	corrosion	no	.....
Oberlin	l., g.	wi. g. 25-30, gs. 5-15, l. 35+	wi. and s. from rust	yes	clean l. with hydrochloric acid
Ravenna	g. wi.	15	rust	small pipes	renew
Salineville	s. and l.	s. 20, l. 25	rust and elements in water	some rust and bends	renew
Shelby	l.	s. 5, i. 10, l. indef.	rust	.....	.....
Struthers	optional with prop. owners	.....	gs. rusting out	some	force pump
Toronto	l.	.....	elect.	yes	renew
Troy	l., wi.	20	rust, corrosion	yes	renewals
Urbana	wi., l.	.....	.....	no	.....
Wapakoneta	l.	.....	.....	corp. cocks only	bore out
Wauseon	l.	indef.	poor workmanship, wiped joints where used	no	.....
Wilmington	l.	20+	.....	no	.....
Oklahoma:					
Blackwell	cl., l., g.	g. 10	rust	no	.....
Clinton	l.	20	.....	no	.....
Commerce	s.	6	rust	no	.....
Durant	l. under pav., gs.	gs. 18, l. indef.	rust	no	.....
El Reno	l.	g. 20, l. 30+	.....	small pipes	renew
Guthrie	l.	10	elect.	no	.....
Henryetta	s. and l.	s. 4	.....	no	.....
Hominy	s. and l.	5	rust, action of soil	no	.....
Madill	g.	20	rust	no	.....
Miami	wi.	20+	.....	no	.....
Norman	wi.	12	rust	no	.....
Oklahoma City	l.	gs. 15-20, l. 20+	.....	no	.....
Okmulgee	l.	.....	.....	no	.....
Sapulpa	l. under pav., s.	s. 7-10	rust	no	.....

Table II—Water Works Services—(Continued)

Municipality	Materials used for services	Average life before renewal years	Cause of deterioration	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal
Oregon:					
Eugene	g.	.....	rust	.....	.....
Grant's Pass	s.	25	rust	no	.....
Hood River	g.	.....	.....	no	.....
La Grande	g.	.....	.....	no	.....
Marshfield, North Bend	gs.	.....	rust occasionally	some	rod out
Roseburg	g.	.....	rust	no	.....
Pennsylvania:					
Ambler	g. wi.	15	elect., rust	.....	.....
Beaver	wi.	24+	lead joints blowing out from pressure	no	.....
Bradford	l.	old pipe, 20-30	.....	.....	renew with l.
Clearfield	l. and g.	g. 25, l. more	corrosion	yes	renew
Elizabethtown	l., wi.	wi. 20	elect., rust	no	.....
Knoxville	wi.	.....	.....	no	.....
Lebanon	l. and wi.	i. 30 days-30 yrs., l. 50	.....	no	.....
Parkesburg	wi., s.	25	closing up or corroding	not much	take out
Rankin	l.	20+	elect., defective joints	no	.....
Ridgway	wi.	20	rust	no	.....
Sewickley	l.	.....	none	no	.....
Tarentum	wi.	12	.....	no	.....
Waynesboro	wi., l.	wi. 20-35	closing up	some	renewal
West Newton	wi.	15	rust	no	.....
Rhode Island:					
Narrag'sett Pr, Wakefield, Peace Dale	l.	30+	.....	yes	force pump
Phenix	gs.	15-20	rust in services	no	.....
Providence	l.	50+	.....	no	.....
South Carolina:					
Chester	g., l. connection	15-20	rust	no	.....
Sumter	g.	15	rust	yes	with jointed rods
South Dakota:					
Rapid City	l.	indef.	.....	no	.....
Watertown	l.	old g.-20	rust	no	.....
Yankton	l.	.....	.....	no	.....
Tennessee:					
Clarksville	l.	indef.	few cases of elect.	no	.....
Covington	l. and i.	.....	.....	some	.....
Dyersburg	l. and s.	l. 30, s. 15	rust	no	.....
Fayetteville	l., g.	20+	rust	no	.....
Jackson	i., l.	.....	rust	yes	rodding
Johnson City	g.	3-4	elect., rust	no	.....
Texas:					
Bryan	g. wi.	10-12	rust	no	.....
Childress	ci.	.....	rust	yes	water pressure
Clarksville	ci.	18+	.....	no	.....
Corpus Christi	l.	wi.-20	.....	no	.....
Del Rio	wi.	10	rust	no	.....
Eastland	wi. and l.	.....	.....	no	.....
Galveston	l.	.....	acid soil, elect.	no	.....
Georgetown	s.	20	rust	no	.....
Gonzales	ci., wi.	indef.	wi. rusts due to soil	.....	.....
Gorman	l.	.....	none	no	.....
Greenville	wi. and l.	.....	.....	no	.....
Longview	wi. and l.	wi. 10, l. indef.	rust	no	.....
McKinney	s., l. under pav.	s.-20	rust	no	.....
Navasota	i. and l.	i. 15-, l. indef.	no	.....	.....
Orange	l. and g.	g. 12	rust on seams	no	.....
Weatherford	l., s.	s. 5-20	rust on acct. of soil	no	.....
Utah:					
Brigham	g., l. gooseneck	40+	none	no	.....
Vermont:					
Bennington	l.	34+	frost	no	.....
Brattleboro	wi.	30	elect.	no	.....
Washington:					
Aberdeen	gs.	12-15	rust on acct. of soil	interior rust of s. pipe	relay pipe
Anacortes	g.	15-20	rust, acid in soil	slightly	remove with wire
Auburn	g.	.....	.....	small pipe	.....
Bellingham	l.	.....	elect.	.....	careful flushing
Cle Elum	g.	15	.....	yes	force pump
Dayton	g.	33+	.....	no	.....
Ellensburg	g. wi.	.....	.....	no	.....
Hoquiam	wi., l. under pavt.	wi. 5-15	salty tide land and elect.	no	.....
Port Angeles	g.	20	rust	yes	air pressure, tank or pump
Snohomish	g.	20	rust	.....	.....
Tacoma	wi.	20	rust mostly	.....	.....
Walla Walla	g.	30-40	elect.	no	.....

Automobiles Break Hydrants

The year 1921 saw an unusual number of hydrants broken by automobiles in Waltham, Mass. The report of the department of public works of that city states that the water division was kept busy during the year replacing hydrants run into by automobiles. A number of the hydrants in the city are of a type such that, when the hydrant is broken off at the surface of the ground, the main valve is opened allowing the free escape of water from the mains. In one case it was necessary to close eight gates on large mains before the discharge of water from a broken hydrant could be stopped and in the meantime approximately 300,000 gallons of water escaped as a geyser in the street. The city is replacing this type of hydrant with another which, when broken, will not allow the water to escape.

Recent Legal Decisions

RIGHT OF MUNICIPALITY TO REMOVE PERMANENT OBSTRUCTIONS PLACED ON SIDEWALK

The city charter and ordinances of the City of Duluth make it unlawful for any person to place obstructions upon its sidewalks which interfere with public travel. In an action by a jeweler to restrain the city from removing a clock and the standard upon which it was erected on a sidewalk, the Minnesota Supreme Court holds, Mueller v. City of Duluth, 188 N. W. 205, that the municipal authorities may summarily cause such an obstruction to be removed, and that an application for a temporary injunction restraining them from doing so was properly refused. The fact that the city has permitted similar obstructions to remain in the street for a considerable time does not operate as an abandonment of the right of the public to its removal if it is an obstruction. Such an obstacle on the sidewalk, which obstructs travel thereon, cannot be regarded as a mere encroachment, so as to make its removal unlawful except upon the decree of a court of equity.

TIME FOR BEGINNING WORK HELD VITAL ELEMENT OF PAVING CONTRACT

The time for beginning work, definitely fixed by a paving ordinance, containing a penalty clause for noncompletion on a certain day, is held to be as much a vital element of the contract and specifications referred to in the ordinance as the time of completion, and tax bills for the work were held void where it was not even begun until after the date fixed for completion. A subsequent ordinance, extending the time for completion, was held to be void because unauthorized and without any valuable consideration.—Parker-Washington Co. v. Field, (Mo. App.) 239 S. W. 569.

CITY NOT LIABLE FOR FALLING WINDOW PANE, UNLESS WITH NOTICE OF ITS INSECURE CONDITION

The Missouri Supreme Court holds, Rice v. White, 239 S. W. 141, that a city was not liable to a pedestrian for injuries caused by a pane of glass falling from a business building in the absence of evidence that the window pane was insecurely fastened, or that it had become loose, and not even on such evidence, unless such condition was known to the city or its agents, or, upon a proper inspection, might have been known to them. A city's obligation to maintain its streets in a reasonably safe condition for public travel does not mean that its agents must enter abutting premises and closely examine all fastenings of window panes. The court quoted Leary v. City of Yonkers, 95 App. Div. 126, a case growing out of the falling of a sign over the street, maintained by a property owner, to the following effect: "It would impose altogether too heavy a burden to hold that the agents of the defendant, in such a case as this, were bound from time to time to enter the premises of the owners or occupants of lands along the streets, and make a close examination of signs or other projections extending over the highway, for the purpose of ascertaining whether or not they were in a safe condition."

MEASURE OF DAMAGES ON REFUSAL TO PERMIT CONTRACTOR TO COMPLETE CONTRACT

The Washington Supreme Court holds, Davis v. Thurston County, 205 Pac. 840, that where the complaint in an action by a contractor for damages for the refusal of the county to permit him to complete his contract did not seek any recovery for profits he would have made had he been permitted to complete the contract, an instruction permitting him to recover lost profits was erroneous. In such a case, the contractor, it is held, would be entitled to recover such proportion of the whole contract price as the amount of the work done by him before the contract was terminated bears to the whole amount of work to be done by him under the contract. For example, if he has completed one-half of all the work to be done, he would be entitled, under this rule, to recover one-half of the contract price. "To fix the amount of recovery by a contractor as 'the amount of his expenditures,' * * * or the reasonable value of the services performed, as held by some cases, would often work a great injustice. Under either of those rules a contractor might recover all or even more than the whole contract price, even though he may have done but half the work contracted for, or, on the other hand, he might be deprived of recovery for such profits as he may have made during his partial performance."

ABANDONMENT OF CONDEMNATION PROCEEDING FOR STREET

When the charter permits a city to abandon a proceeding instituted by it to acquire private property for a public street, the Minnesota Supreme Court holds, Mc. Rostie v. City of Owatonna, 138 N. W. 52, that the city may do so within the time prescribed without incurring liability to the owner for his voluntary acts in changing the condition of the premises by the removal of buildings thereon after the award of the commissioners is filed and prior to the abandonment of the proceeding. Where there has been such abandonment the possession and right of possession of the owner has never been interfered with. The mere entry to make and work a proper survey, doing no other injury to the property, does not give a cause of action.

ASSESSMENT OF SPECIAL BENEFITS FROM PARK IMPROVEMENTS

The Minnesota Supreme Court, In re Improvement of Lake of the Isles Park, 188 N. W. 54, regards it as too firmly settled to admit of dispute that acquiring land for a public park, fitting it for open-air recreation, and adding to its appearance by planting trees, shrubbery and flowers are all local improvements of special benefit to private property in the neighborhood. It holds that whether certain additions to a public park are of special benefit to property in the neighborhood is a matter of opinion on the facts as they appear, and the judgment of the body charged with the duty of ascertaining and assessing benefits will not be disturbed by the courts unless reasonable men could not have arrived at the same conclusion honestly.

NEWS OF THE SOCIETIES

CALENDAR

July 27-28—SHEET METAL CONTRACTORS' ASSOCIATION OF PENNSYLVANIA. Convention. Hotel Lawrence, Erie, Pa. Secretary, W. F. Angermeyer, 714 Homewood Ave., Pittsburgh, Pa.

July 26-28—WISCONSIN STATE ASSOCIATION, NATIONAL ASSOCIATION OF STATIONARY ENGINEERS. Convention and mechanical exhibit. Capitol Building, Madison, Wis. Chairman, convention committee, J. J. Novotny, 2133 Fox Ave., Madison, Wis.

Aug. 15-17—LEAGUE OF IOWA MUNICIPALITIES. Annual meeting. Secretary, F. G. Pierce, Marshalltown, Ia.

Aug. 15-18—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Fiftieth convention. Municipal Auditorium, San Francisco, Cal. Secretary, James J. Mulcahey, Chief, Yonkers, N. Y., Fire Dept.

Aug. 28-Sept. 2—NATIONAL SAFETY CONGRESS. Detroit, Mich.

Aug. 29-30-31—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Annual convention, Williamsport, Pa. Fred H. Gates, Secretary, Wilkes-Barre, Pa.

Sept. 11-15—ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. New Auditorium, Cleveland, Ohio.

Sept. 12-15—NEW ENGLAND WATER WORKS ASSOCIATION. 41st annual convention. New Bedford, Mass. Secretary, Frank J. Gifford, Tremont Temple, Boston, Mass.

Sept. 14-16—AMERICAN ASSOCIATION OF PORT AUTHORITIES. Convention at Toronto. Secretary, M. P. Fennell, Jr., Montreal.

Sept. 25-28—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention. Hot Springs, Ark.

Oct. 1-6—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. Cleveland, Ohio.

Oct. 16-19 — AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. Clevelnd, Ohio.

Nov. 15-16—NATIONAL INDUSTRIAL LEAGUE. Annual meeting. New York City. Secretary, J. H. Beck, Chicago.

Dec. 7-13—NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING. New York City.

AMERICAN SOCIETY FOR TESTING MATERIALS

The twenty-fifth annual convention was held at Atlantic City on June 27th.

The wide range of activities of the society made the holding of semi annual meetings imperative and it was suggested that one meeting be held in June for consideration of standards and tentative standards and another be held in mid-winter for the consideration of testing and research.

The total membership was estimated at 3,030, showing an increase of 122 for the last year.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

The American Engineering Council of the Federated American Engineering Societies announce the election of the following officers of the American Institute of Electrical Engineers: President, F. B. Jewett of New York; Vice-Presidents, G. Faccioli of Pittsfield, Mass.; Prof. W. I. Slichter of Columbia University, R. F. Schuchardt of Chicago, H. W. Eales of St. Louis, and H. T. Plumb of Salt Lake City; Managers, H. M. Hobart of Schnectady, N. Y., Ernest Lunn of Chicago, and G. L. Knight of Brooklyn; Treasurer, George A. Hamilton of Elizabeth, N. J.; Secretary, F. L. Hutchinson of New York.

TECHNICAL SOCIETIES PLAN PUBLIC WORKS BOARD

A plan for including a state board of public works in the new constituiton of the State of Missouri has been prepared by the Associated Engineering Societies, a chapter of the American Institute of Architects and the contractors, all of the city of St. Louis. The plan provides for directors of utilities, highways, water works, and conservation and board president to be appointed by the Governor of the State and to have supervision of activities in five divisions.

The division of structures will include land, natural resources, structures, equipment and improvements in which the state is interested.

The division of utilities includes maintenance, equipment, operation and service of all public utilities owned or operated by the state and the adjustment of rates and charges therefor.

The division of highways includes construction, maintenance, reconstruction and inspection of all public highways and bridges.

The division of water works will include waterways, watersheds, stream pollution, water works, irrigation projects, water power development, drainage and sanitary matters.

The division of conservation will deal with the conservation of resources, state planning and public safety.

The united support of engineers and contractors is invited for advocating the incorporation of the board of public works in the revised constitution.

THE ENGINEERS' SOCIETY OF PENNSYLVANIA

The following officers were elected at the recent annual meeting: President, Theodore E. Seelye; First Vice-President, Robert W. Moorehead; Second Vice-President, William Brown, Secretary, Howard E. Moses; Treasurer, Harry T. Neale.

THE ARKANSAS CHAPTER OF THE AMERICAN ASSOCIATION OF ENGINEERS

F. J. Herring addressed the meeting held recently at Little Rock, on the Salt Lake Convention and an address on the work done along the Mississippi Levee was made by L. R. Parmelee. An inspection was made of the Broadway Bridge across the Arkansas River.

PERSONALS

Harmon, W. W., has been appointed city engineer and ex-officio superintendent of streets of Oakland, Cal.

Allen, Joseph, Shell Lake, Wis. has been appointed County Highway Commissioner of Washburn County, Wis.

Condon, Russell, well-known public works contractor and President of the Omaha Chapter of the Associated General Contractors of America, died at the age of 52.

Ferris, John, has resigned from the position of State Highway Commissioner of New Jersey.

Wievel, George, city engineer of Platteville, Wis., died recently.

Baird, W. L., has resigned as superintendent of the city water works of Moberly, Mo. He is succeeded by Sam Duncan of Marshall, Mo.

Bickley, Creighton D., has been appointed highway construction engineer of Essex County, N. J.

Closson, Edgar S., general supervisor of bridges and structures, New Jersey State Highway Department, is now associated with the Lynch Construction Co., of New York.

Plato, E. J., has been appointed city purchasing agent for Sacramento, Cal.

Corcoran, C. J., has been appointed superintendent of water works, for the city of St. Helena, Cal.

Govette, A., has been appointed superintendent of roads for Longuille, Quebec, Canada.

Spear, R. E., has resigned from the position of city engineer of Ambridge, Pa.

Swandon, Melvin O., has been appointed superintendent of the Water and Light Board of Jamestown, N. Y. He succeeds Lyman P. Hapgood who is now chief consulting engineer.

Wright, G. E., formerly assistant engineer with the city engineering department of Bridgeport, Conn., is now engaged in a similar capacity at Gloversville, N. Y.

Russell, Walter C., sanitary engineer of Flint, Mich., has resigned and will accept a similar position with the city of Richmond, Va.

Pollack, James R., assistant city engineer of Flint, Mich., has resigned.

Nice, Everett W., has been appointed city engineer of Flint, Mich., succeeding E. C. Shoecraft, resigned.

Kearney, Stephen, city engineer of Lowell, Mass., since 1911, has resigned.

Lovis, A. M., formerly first assistant engineer of the highway division of the Massachusetts Dept. of Public Works, died recently.

Earle, W. C., has been appointed city engineer and superintendent of streets of Pasadena, Cal.

Wymer, Ralph W., has been appointed sewage-disposal plant engineer at Barberton, Ohio, succeeding E. B. Patterson, resigned.

New Appliances

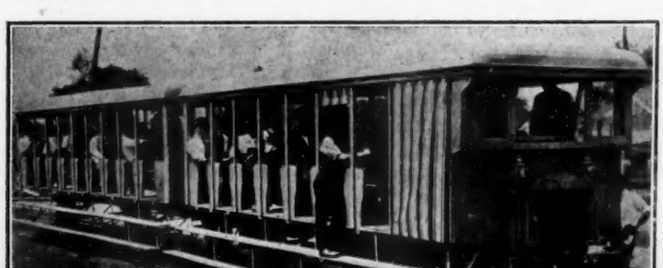
Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

A GASOLINE SUMMER TRAIN

The gasoline summer train is the very latest development of light equipment for railroad service. A two car unit of this type, manufactured by the Four Wheel Drive Auto Co. has just been completed. The cars are of the open type with adjustable side curtains, and each seat provides ample room for five grown persons. The forward car of this unit has a seating capacity of 35 persons and the rear car can accommodate fifty.

The cars are equipped with air brakes, electric starting devices and horn, standard MCB couplers, locomotive type "cowcatcher" on the forward car, sanders for sanding the rails, and high speed reverse gear which enables the cars to go as fast in reverse as they will go forward.

On short line railroads and especially on electric lines over which excursions are run in the summertime, the gasoline railway summer train is recommended for reducing operating costs and at the same time maintaining reliable transportation service.



GASOLINE TRAIN FOR SUMMER EXCURSIONS.

During the test runs which have been made with this equipment a speed of between 35 and 40 miles per hour has been attained. The cars have rounded curves up to sixteen degrees curvature at a speed of 25 miles per hour, without the least trouble and are capable of rounding much sharper curves at a reduced speed.

CALCO AUTOMATIC DRAINAGE GATES.

A bulletin describing the application of Calco flap gates to the ends of corrugated pipes, drains and culverts to protect the outlet of the discharge pipes, especially in draining projects for 79,000,000 acres of land in the United States reclaimable by drainage. Illustrated by several views of the gates fully or partially submerged.

The special features of the gate are the double hinge and great flexibility of bearings which have sufficient play to permit the movement of the valve by water pressure from behind not only at the bottom but at the top also, so that the gate offers very little obstruction even to the pipe flowing full of water. The valve and gate are accurately machined to insure water tightness and the motions of opening and closing grind away rust, dirt or other obstructions, keeping them in good working order. They are built by the California Corrugated Culvert Co. for pipes 80 to 14 inches in diameter.

WEAR PROOF SIGNS

Union Iron Products Co., Chicago, Ind., 6x9 inches, 24 pages, catalog to guide state, county or city officials in the selection of proper street signs for highway markers, describes and illustrates standard signs and poles, providing legibility, durability and attractiveness. The letters are countersunk in heavy metal and are either brightened or renewed with special rollers. Special road signs, house numbers, push brooms and zoning paint for marking safety zones on the pavements are also listed.

REINFORCED CONCRETE PIPE

Large diameter reinforced concrete pipe designed to withstand high pressure is manufactured by the United Concrete Pipe Co., which issues specifications and details of important points of its construction in sizes of 24 to 84 inches in diameter. Up to 48 inches, inclusive, the pipe is reinforced by a single ring of American Steel & Wire Co.'s triangle mesh and above that size by two rings placed about 1½ inches from the inner and outer surfaces. The pipe is made in standard sections having a uniform length of 4 feet and a thickness varying from 3 to 8 inches, which provides for a telescopic joint flush with both interior and exterior surfaces of the pipe. The length of the joint varies from 3 to 4½ inches and it is filled with cement mortar, into which the reinforcement projects.

Pipe of this type was laid for the city of Syracuse, New York, where 81 pieces, 60 inches in diameter inside and 20 feet long, formed a sewer outfall into Lake Onondago. Each piece had a thickness of 6 inches, contained 6.4 yards of concrete, and weighed 13 tons. They were concreted at the rate of two per day by a gang of from 18 to 25 men. They were poured, stripped, steam cured and revolved from vertical to horizontal position after they were four or five days old, stored, and subsequently they were rolled down inclined skids and launched, towed to position, sunk by admitting water ballast, and assembled by a derrick boat and diver.

"LITTLE GIANT" PIPE WRENCH

The "Little Giant" Pipe wrench, a new wrench with several interesting improvements has just been put on the market by the Greenfield Tap & Die Corporation. It has the "end opening" feature which is familiar to users of machinists' wrenches.

Its advantage over the conventional style is the ease with which it can handle pipes in corners, close to walls and similar confined places. The person using it can set it straight on the pipe as he would a pair of pliers, instead of having to fit the jaws on from the side.

The "Little Giant" wrench has only three parts; a handle and jaw in one piece, which is drop forged and heat treated, a movable jaw likewise drop forged and heat treated and a hardened steel nut. There are no springs, rivets, frame or pins, all these parts being eliminated. In spite of the absence of springs this wrench takes hold and releases instantly at the option of the user.

The 14-inch size has repeatedly withstood stresses in excess of 4,700 inch-pounds without slipping or bending. The army and navy departments require a test of 2,800 inch-pounds for a wrench of this size.

Another feature is the double set of teeth on the main jaw. The movable jaw can be engaged at the option of the operator with either of these sets of teeth with consequent lengthened life. On the large sizes, 14 inches and greater, two additional sets of teeth are provided, making four in all, and the movable jaw can be reversed to engage these additional sets of teeth, which are below the adjusting nut. This is very useful in connection with certain classes of work, besides practically quadrupling the life of the tool. The "Little Giant" wrench is manufactured in 8, 10, 14, 18 and 24 inch sizes, of which the three smaller sizes are already on the market.

Advance Contract News

ADVANCE INFORMATION ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STREETS AND ROADS

Ala., Decatur 2 p.m., July 31
For regrad., scarifying and resurf. rd.—J. P. Troup, Judge of Prob.

Ill., Chicago 11 a.m., July 5
For imp. sev. sts.—M. J. Faherty, Pres., Bd. Local Impr.

Ind., Albion 2 p.m., Aug. 3
For grading, drain. and pav. sev. hwys.—H. Clayton Erwin, Co. Aud.

Ind., Avilla 7:30 p.m., Aug. 3
For impr. and pav. street.—S. P. Stewart, Town Clerk.

Ind., Brazil 10:30 p.m., Aug. 8
For grad., drain. and pav. sev. rds.—W. E. Parrish, Co. Aud.

Ind., Broad Ripple 7:30 p.m., July 25
For pav., constr. curbs and gutters, also sewers in sev. sts.—Bd. of Trustees.

Ind., Covington 2 p.m., Aug. 8
For grad., drain. and pav. hwy. with gravel.—H. W. Newlin, Co. Aud.

Ind., Crawfordsville 10 a.m., Aug. 8
For grad., drain. and pav. hwy. with gravel.—W. McClelland, Co. Aud.

Ind., Crown Point 1 p.m., July 31
For grad., pav. and drain. gravel rd.—George M. Foland, Co. Aud.

Ind., Crown Point 1 p.m., Aug. 8
For grad., drain. and pav. sev. hwys.—G. M. Foland, Co. Aud.

Ind., Evansville 10 a.m., Aug. 10
For impr. sev. hwys.—W. M. Copeland, Co. Aud.

Ind., Indianapolis 1 0a.m., July 25
For const. 3.533 mi. F. A. 32, Sect. A-C.—J. D. Williams, Dir., State Hwy. Com.

Ind., Indianapolis 2 p.m., July 28
For impr. certain street.—Bd. Pub. Works.

Ind., Jasper 1 p.m., Aug. 7
For grad., drain. and pav. hwy.—Frank J. Song, Co. Aud.

Ind., Lawrenceburg 12 m., Aug. 7
For constr. 31,362.6 and 31,498 feet of broken stone rd.—Arthur E. Jackson, Co. Aud.

Ind., Loganasport 10 a.m., Aug. 7
For impr. hwy.—Harry M. Gardner, Co. Aud.

Ind., Madison 1 p.m., Aug. 8
For grad., drain., pav. and constr. 9,800, 9,458 and 12,768 feet of hwy.—Charles S. Dibler, Co. Aud.

Ind., Monticello 10 a.m., July 29
For impr. certain street.—James Y. Stephenson, City Clerk.

Ind., Monticello 1 p.m., Aug. 8
For roads, 10,620 feet grav., 7,181 feet brick and stone, and 15,830 feet stone.—Co. Hwy. Com.

Ind., Paoli 2 p.m., Aug. 7
For constr. 13,083 ft. rd.—P. M. Stephenson, Co. Aud.

Ind., Valparaiso 2 p.m., Aug. 8
For constr. 4,643 mi. and 1,759 mi. gravel rds., $86,135.73 and $22,880.80.—B. H. Kinne, Co. Aud.

Ind., Washington 10 a.m., Aug. 8
For impr. 3 mi. hwy.—Daniel I. Meyers, Co. Aud.

Iowa, Davenport 2 p.m., July 25
For tile drain on sev. rds.—County Aud.

Iowa, Eldora 1:30 p.m., July 25
For grad. 4.01 mi. rd.—Co. Engineer.

Iowa, Osage 1:30 p.m., July 25
For 4,000 cu. yds. and 12.727 mi. excav. on rds.—Co. Aud.

Iowa, Sac City 11 a.m., July 26
For graveling 3¼ mi. and 8⅛ mi. rd.—Co. Aud.

Iowa, Toledo 10 a.m., July 26
For grav. surf. 25.05 mi. of rd.—Co. Aud.

Iowa, Webster City 1:30 p.m., July 31
For grad., drain. and gravel surf. sev. rds.—Co. Aud.

Kan., Iola Aug. 1
For constr. 0.992 mi. conc. or bit filled brick rd.—St. Hwy. Com.

Kan., Larned July 28
For constr. 10.283 mi. sand-clay rd.—Vaughn Stuart, Co. Engr.

Md., Baltimore 12 m., July 25
For constr. 1.3, 1.2, 0.26, 1.5, 1.5, 0.75, 3.7, 1.8 mi. of st. hwy.—John N. Mackall, Ch. St. Rds. Com.

Md., Baltimore 11 a.m., July 26
For building road for Water Dept.—City Register, City Hall.

Mass., Boston 12 m., July 25
For granite block pavement.—City Aud.

Mass., Boston 1 p.m., July 25
For building 3 sections of hwy.—A. W. Dean, Chief Engr., Dept. Pub. Wks., Division of Hwys.

Mass., Westfield 2 p.m., July 26
For pav. with reinf. conc.—Oren E. Parks, Supt. Pub. Works.

Mich., Grand Rapids 9 a.m., July 25
For impr. 2.564 mi. rd.—Frank F. Rogers, St. Hwy. Comr.

Mich., Grand Rapids 9 a.m., July 28
For impr. 2.564 and 3.205 mi. rd.—Frank F. Rogers, St. Hwy. Com.

Mich., Mason 1:30 p.m., July 25
For impr. 0.500 and 2.564 mi. of rd.—Frank F. Rogers, St. Hwy. Com.

Mich., Saginaw 12:30 p.m., July 27
For impr. 6.460 and 2.064 mi. rd.—Frank F. Rogers, St. Hwy. Com.

Minn., St. Paul 11:30 a.m., July 31
For grad. and impr. sev. streets.—H. W. Austin, Purchasing Agent.

Mo., Bloomfield 11 a.m., July 25
For impr. 4.256 and 9.943 mi. state roads.—Co. Clk.

Mo., Cassville 2 p.m., July 27
For impr. 4.571 mi. state road.—Co. Clk.

Mo., Lexington 11 a.m., July 25
For impr. 4.694 mi. state road.—Co. Clk.

Mo., St. Louis Noon, July 25
For reconst. and impr. alleys.—Bd. Pub. Service.

Mo., Shelbyville 11 a.m., July 27
For impr. 4.529 mi. state road.—Co Clk.

Mo., Versailles 1 p.m., July 31
For impr. 0.378 mi. state road.—Co. Clk.

Miss., Quitman Aug. 8
For misc. repair work.—St. Hwy. Com.

Neb., Fremont 2 p.m., July 28
For grad., pav. and curb. sev. sts.—J. Monnich, Ch. Bd. Pub. Wks.

N. J., Belleville 8:45 p.m., July 25
For constr. and repair. pav. by penetration method.—F. T. Sheppard, Town Engr.

N. J., Woodbury 10 a.m., Aug. 10
For constr. state hwy. route No. 6—C. N. Steelman, Co. Clk.

N. M., Roswell 4 p.m., Aug. 4
For pav. curbs, gutters, grad. and appurt.—J. A. Gilmore, City Clk.

Nev., Carson City 2 p.m., Aug. 2
For constr. 7.05 mi. state hwy.—G. W. Borden, St. Hwy. Engr.

N. Y., Boro Brooklyn 11 a.m., July 26
For impr. sev. sts.—Edward Riegelmann, Boro Pres.

N.Y., N.Y.C., Boro Queens 11 a.m. July 25
For grad., curb. and pav. sev. sts.—M. E. Connolly, Boro Pres.

N. C., Lenoir 2 p.m., Aug. 3
For grad. and pav. certain sts.—F. H. Coffey, Chm. St. Com.

N. D., Fargo 10 a.m., July 28
For constr. state hwy.—Co. Aud.

N. D., Hillsboro July 27
For constr. 6,923 mi. earth rd.—St. Hwy. Com.

Ohio, Akron 12 m., Aug. 2
For grad. and pav. sev. sts.—M. P. Tucker, Dir. Pub. Service.

Ohio, Akron Aug. 8
For rough and finish grad. and lay. sidewalks.—Irene M. Moses, Clk. Bd. Education.

Ohio, Cleveland Aug. 1
For grad., drain. and laying of sidewalks.—P. H. Prasse, Village Clk., S. Euclid

Ohio, Akron 10 a.m., Aug. 7
For constr. guard rail on sev. sts.—Clk. Bd. Co. Com.

Ohio, Bowling Green July 27
For grad., graveling and culvert work on rd.—W. P. Reille, Co. Aud.

Ohio, Cincinnati July 28
For paving road.—Albert Reinhardt, Clk. to Co. Comrs.

Ohio, Cleveland July 26
For pav. rd.—A. J. Heber, Clk. Co. Com.

Ohio, Elyria July 25
For grad., conc. and drain. rd.—Clk. Co. Com.

Ohio, Shaker Heights Aug. 3
For pav. street.—Carl A. Palmer, Vil. Clk.

Ohio, Toledo 12 m., July 25
For const., grad., drain. and pav. sev. sts.—W. T. Jackson, Dir. Pub. Service.

Pa., Hallstead 8 p.m., Aug. 4
For constr. conc. hwy. and appurt.—F. C. Brown, Pres. Boro. Council.

Pa., Oil City 4 p.m., Aug. 1
For resurf., grad. and pav. sev. sts.—B. B. Weber, City Engr.

Pa., Philadelphia July 25
For grad., pav. and impr. streets and roads.—Fred C. Dunlap, Chief of Bur. of Hwy., Dept. Pub. Wks.

Pa., Washington 7:30 p.m., July 31
For constr. and resurf. pavements.—J. F. Curran, Pres. Town Council.

R. I., Warwick 1 p.m., July 25
For curb., grad. and oiling.—Jas. T. Lockwood, Town Clk.

Utah, Salt Lake City 2 p.m., July 25
For constr. and grav. surf. rd.—H. C. Means, St. Rd. Engr.

Wash., Olympia 2 p.m., Aug. 1
For pav. .25 mi. Pacific Hwy.—James Allen, Suprv. of Hwys.

W. Va., Charleston 10 a.m., Aug. 16
For grad. and pav. 2 mi. rd.—R. N. Moulton, Co. Clk.

Wis., Madison 2 p.m., July 26
For grad. and surfac. co. rd.—A. R. Hirst, St. Hwy. Com. Engr.

SEWERAGE

Fla., Lake Worth Aug. 1
For sanitary sewerage sys. and septic tank.—W. Randolph, City Engr.

Ind., Indianapolis 10 a.m., July 31
For constr. sewage disposal plant,—J. A. Craven, Pres. Bd. San. Com.

Ky., Louisville 12 m., July 26
For constr. sewer and drain.—G. T. Wood, Ch. Com. Sewerage.

Minn., St. Charles 9 p.m., July 31
For constr. sewer sys. and disposal plant.—City Clk.

N. J., Belleville 8:45 p.m., July 25
For constr. storm water sewers.—F. T. Shepard, Town Engr.

N. J., Jersey City 3 p.m., July 25
For constr. vitrified pipe sewer.—E. J. Holland, City Clk.

N. Y., Boro Brooklyn 11 a.m., July 26
For constr. 8 sewers in sev. sts.—Edward Riegelmann, Boro Pres.

N. Y., Boro Queens 11 a.m., July 26
For constr. sewer, receiving basins and appurt.—Maurice E. Connolly, Pres., Queens Subway Bldg., L. I. City.

N. Y., Gloversville 5 p.m., July 25
For constr. sev. san. sewers.—H. J. Hanmer, City Engr.

N. Y., Rye 8:15 p.m., July 26
For constr. c. i. main sewer.—William H. Selzer, Village Clk.

N. C., Newton 2 p.m., July 25
For constr. filtration plant and water and sewer extensions.—Sid. J. Smyre, Mayor.

Ohio, Toledo 12 m., July 25
For constr. sev. local sanitation sewers.—W. T. Jackson, Dir. Pub. Service.

Okla., Oklahoma City 12 m., July 25
For constr. sev. sewers.—C. F. Semmelbeck, City Clk.

S. D., Emery 4 p.m., July 28
For constr. san. sewerage sys. and water works distribution sys.—Leo Schroeder, City Aud.

WATER SUPPLY

Ill., Chicago 11 a.m., July 25
For water supply and service pipes in sev. sts.—Michael J. Faherty, Pres. Bd. Local Impr.

Md., Baltimore 11 a.m., July 26
For furn. and laying 1½-inch water line.—Bd. of Awards.

Minn., Lake City 8 p.m., Aug. 1
For constr. water main extension.—H. V. Fick, City Clk.

N. J., Belleville 8:45 p.m., July 25
For constr. lock or core joint pipe.—F. T. Shepard, Town Engr.

N. Y., Boro of Queens July 25
For hauling and laying water mains and appurt. in sev. streets.—Nicholas J. Hayes, Comr. of Water Supply, Municipal Bldg.

N. Y., New York City 11 a.m., July 25
For haul. and laying water mains and appurt.—N. J. Hayes, Com.

Ohio, Cleveland Aug. 1
For laying water mains.—P. H. Prasse, Vil. Clk. of S. Euclid.

Ohio, Toledo 12 m., July 25
For constr. coagulating basin at Water Purification Works.—W. T. Jackson, Dir. Pub. Service.

Ohio, Walbridge 12 m., Aug. 9
For constr. water works system.—N. Gordon, Clk. Bd. Trustees.

Okla., Oklahoma City 12 m., Aug. 2
For constr. water filtration plant.—C. F. Semmelbeck, City Clk.

Pa., Coalport 6 p.m., Aug. 1
For constr. conc. reservoir.—P. C. Gates, Secy. Town Council.

Pa., Ebensburg 12 m., July 28
For constr. c. i. water line.—Herman T. Jones, Co. Controller.

S. D., Mitchell 8 p.m., Aug. 7
For constr. water main extensions.—Fred J. Henson, City Engr.

DRAINAGE AND IRRIGATION

Ind., Kokomo 2 p.m., Aug. 12
For ditch constr.—Ellsworth Hunt, Comr. of Drainage.

Iowa, Boone 12 m., July 28
For constr. tile drain.—J. R. Curry, Drainage Clk.

Minn., Olivia July 26
For constr. ditch.—A. O. Schmidt, Co. Aud.

Ohio, Wooster 12 m., Aug. 10
For constr. ditch impr.—Chas. F. Schoff, Secy. Bd. Co. Com.

BRIDGES

Ind., Logansport 10 a.m., July 29
For constr. of bridge.—H. M. Gardner, Co. Aud.

Ind., Rockport 2 p.m., Aug. 8
For repair. conc. bridge.—R. W. Richards, Jr., Co. Aud.

Iowa, Fort Dodge July 26
For constr. bridge and culvert work.—Co. Aud.

Iowa, Osage 9 a.m., July 25
For constr. bridge and culvert work.—Co. Aud.

Iowa, Primghar 1:30 p.m., July 26
For constr. truss and culvert work.—Co. Aud.

Iowa, Webster City 11 a.m., July 31
For constr. bridge and culvert work.—Co. Aud.

Kan., Larned July 28
For constr. reinf. conc. bridge.—St. Hwy. Com.

Md., Baltimore 11 a.m., July 26
For constr. conc. floor on bridge.—W. A. Megraw, Water Engr., City Hall.

Mich., Escanaba 1:30 p.m., July 27
For constr. 2 piers on reinf. conc. bridge.—Co. Aud.

Minn., Duluth 1 p.m., July 28
For bridgework and repair.—Walter H. Borgen, Co. Aud.

Minn., St. Paul Aug. 1
For constr. sev. bridges and culvert work.—State Hwy. Dept.

N. H., Concord 2 p.m., July 28
For constr. 3 I-beam bridges.—F. E. Everett, St. Hwy. Com.

N. Y., Boro Manhattan 12 m., July 7
For constr. superstructure on pier.—John H. Delaney, Comr. of Docks, Pier A, North River.

N. D., Fargo 10 a.m., July 28
For constr. state hwy. bridge.—Co. Aud.

Ohio, Bowling Green July 31
For constr. conc. bridges and abutment.—E. E. Coriell, City Aud.

Ohio, Columbus July 3
For constr. conc. girder bridge and abut., Est. $3,446.—Leon C. Herrick, State Dir. Hwys.

Ohio, Springfield 10 a.m., Aug. 1
For rebuilding and repairing bridge abutment and wing walls.—Bd. Com., Clark County.

Ohio, Toledo 10:30 a.m., Aug.
For bridge impr. and culvert work.—Adelaide E. Schmitt, Clk. Bd. Co. Com.

Ore., Portland July 2
For const. reinf. conc. arch span bridge.—St. Hwy. Com.

MISCELLANEOUS

Can., Ont., Chatham 4 p.m., July 3
For constr. garbage and refuse incinerator.—C. H. R. Fuller, City Engr.

Del., Wilmington 11 a.m., Aug. 1
For excavating Inland Waterway from Delaware River to Chesapeake Bay.—U. S. Engineer Office.

Fla., Ft. Lauderdale 11 a.m., Aug. 1
For inlet constr.—Frank A. Bryan, Clk. Co. Com.

Fla., Port Tampa City 8 p.m., Aug. 1
For constr. conc. seawall and dredging channel.—Mrs. R. E. Davis, City Clk.

Ky., Louisville July 2
For metal work, Dam No. 44.—Dist. Engr., War Dept.

Md., Baltimore 10 a.m., July 2
For furn. and deliv. road roller with power scarifier.—A. E. Christhilf, Hwy. Engr.

Md., Baltimore 11 a.m., July 2
For furn. valves for Water Dept.—W. A. Megraw, Water Engr., City Hall.

Minn., St. Paul 11:30 a.m., July 2
For c. i. pipe specials, coal handling and conveying equipment, structural steel and steel and iron castings.—R. W. Austin, Purchasing Agent.

N. J., Newark 10:15 a.m., July 2
For 380 various street signs.—Thomas L. Raymond, Dir. Dept. Streets and Pub. Impr.

Ohio, Sidney July 2
For deep well pump and motor.—Frank Smith, Dir. of Service.

Pa., Philadelphia Aug. 7
For river dredging.—U. S. Engr. Office, 815 Witherspoon Bldg.

EXPANSION JOINT

1. Type A-A—Fibre centre non-oozing joint (Solid crown and sides).
2. Type B—Bituminous cellular fibre joint (75% Bitumen).
3. Type D—Cellular fibre joint (solid edges and sides, self expanding).

SERVICISED PAT. PENDING 1920

Type C—Sidewalk joint ½-in. a specialty.

For concrete Roads—Granite, Brick and Wood-block Paving Buildings—Bridges—Walls and Reservoirs.

Samples and Prices on Request.

SERVICISED PRODUCTS CO. 1ST NATL BANK BLDG. CHICAGO

Work Contemplated

STREETS AND ROADS

Ala., Birmingham—Jefferson Co. and City plan paving with asphalt on concrete base, combined concrete curb and gutter, 1½ mi. South Bessemer connection, 20-26 ft., $56,000; 2½ mi. from Fairfield to Fairview, 18-24 ft., $68,000; 1½ mi. Vanderbilt Rd., 20-26 ft., $63,000; 3 mi. Gate City-Irondale Rd., 20-26 ft., $108,000; paving with asphalt on concrete 5 mi. Birmingham-Pratt City Rd., $110,000.

Ark., Little Rock—Federal aid to District No. 5, Arkansas county, $24,750; District No. 2, Chicot county, $50,000; District No. 3, Cleveland county, $13,500; District No. 1, Columbia county, $10,000; Conway-Vilonia district, Faulkner county, $16,000; Little Rock-Hot Springs highway, Garland county, $150,000; District No. 6, Grant county, $24,000; District No. 6, Little River county, $19,000; District No. 3, Lonoke county, $16,000; District No. 1, Mississippi county, $150,000; District No. 3, Monroe county, $69,000; Richland Township district, Monroe county, $19,000; Helena-Ferguson district, Phillips county, $85,000; District No. 1, Pope county, $35,000; District No. 2, Pope county, $149,000; Little Rock-Hot Springs district, Saline county, $200,000.

Ark., Little Rock—Allotment of $350,000 federal aid to the Little Rock-Hot Springs Highway, by the Arkansas Highway Commission will insure the construction of an 18-foot asphalt or concrete road from Little Rock to Hot Springs.

Calif., San Francisco—Mt. Vernon Ave., between Howth and Louisburg Sts., by grading and the construction of curbs, sidewalks and an asphaltic concrete pavement.

Cal., Santa Cruz—Received no bids June 26, 341,611 sq. ft. grading, 192,649 sq. ft. 5-in. concrete pavement, 2,730 ft. detached concrete curbs, 4,047 standard concrete sidewalk curb, 4,800 sq. ft. 4-in. concrete sidewalks, 4,526 ft. 10-18 in. drain pipe, etc. J. K. James, city engr.

California—The City Attorney was directed to commence condemnation proceedings to acquire a piece of land at Fourteenth Ave. near Lawton St. required for street purposes.

Cal., Lindsay—Plans prepared improving Lindsay Ave., Harvard and Orange Sts., et al., $10,250 cu. yd. grading.

Cal., Yuba City—Concrete paving 306 ft. Hawthorne St. and 310 ft. Linden St., both 42 ft. wide, 4 in. thick; 633 ft. Orange St., 367 ft. Walnut St., 367 ft. Olive St. and 367 ft. Chestnut St., all 44 ft. wide, 4 in. thick; 2,769 ft. Cooper Ave., 42 ft. wide, 2,422 ft. Bridge St., 50 ft. wide, all 5 in. thick. E. Von Geldern, Yuba City, engr.

Cal., Richmond—Plans prepared 4,100 cu. yd. grading, 33,000 sq. ft. 6-in., asphaltic concrete pavement, 900 lin. ft. concrete curbs and gutters, 2,000 sq. ft. concrete walks, 150 cu. yd. concrete walls and underpinning, 700 lin. ft. 10-in. vitr. and 338 lin. ft. 8-10 in. corrugated pipe, in connection with city subway.

Cal., Marysville—Yuba Co. plans prepared grading and shaping roadbed, 7½ mi. long, 40,000 cu. yd. excav.

Del., Wilmington—The United States Engineer's office, of this city, has asked for bids on excavating 5,600,000 cubic yards of earth for improvements to the Chesapeake and Delaware Canal, to cost $1,500,000.

Fla., Miami—Dade County Commissioners are preparing to issue $1,000,000 bonds for roads, voted recently.

Fla., Sumter Co.—Petitions for bond issue of $136,000 for construction of roads with asphalt surface on rock base. Development of county's resources now assured.

Ill., Chicago—City Council of Chicago ordered that a cement sidewalk six feet in width be constructed on both sides of North Menard Avenue from the south line of Addison Street to the north line of Belmont Avenue.

Ill., Chicago—Ord. cement sidewalk six feet in width be constructed on a system of streets as follows, towit: Both sides of West 113th Street from the west line of Princeton Avenue to the east line of Stewart Avenue and the east side of Harvard Avenue from the south curb line of West 113th Street to the north line of West 114th Street.

Ind., Hartford City—The Blackford county commissioners ordered the construction of the Philebaum road at an estimated cost of $1,386.14, and the Studebaker road, at $1,417.12.

Ind., Indianapolis — Improvement resolution to curb, widen, gravel, cement, asphalt Sheffield, Burgess, Julian, 59th St., Crescent St. and various alleys.

Ind., Indianapolis—Imprt. res. for Greenland Ave., 47th St., Delaware St., Beverly Drive, Worth St. and Washington Boule., grd., pav., curbing, sewering and inlet connections.

Ind., Indianapolis—City to improve various alleys and alleyways.

Ind., Indianapolis—The city administration has improvement program for next four years; making boulevard thoroughfare from Irvington to Tibbs or Belmont avenue on the west. The proposed thoroughfare will be forty feet wide and change New York street into a boulevard for light travel, leaving Washington street to carry the heavy traffic.

Ia., Clinton—Sidewalks—Constr. ordered for various sts. F. W. Seedham, city clk.

Ia., Le Mars—Pav.—Plymouth co. will pav. in Le Mars and make improv. on prim. rd. thru Hinton.

Ia., Davenport—St., Alley Improv.—Will pav. Hildreth st. bet. 11th-12th sts. (est., $1,655) and alley bet. Perry st.-Pershing av. from 15th st. to Kirkwood blvd. (est., $1,418) with concr. 6 in. thick.

Ia., Des Moines—Pav.—Resol. passed for pav. various sts. A. E. McGlothlen, city clk.

Ia., Council Bluffs—Sidewalks—Res. adopted to improve cement walks on various sts.

Ia., Grundy Center—Grav.—Grundy co. will grav. 18 mi. rd. from W. of twn. to Hardin co. line and from Morrison to Black Hawk co. line.

Ia., Muscatine—Pav. Repairs—Will prep. plans for Mulberry, Lucas st. and Oakland Dri. Bithulithic.

Ia., Albia — Grad., Pav., Gutter—Resol. passed for various sts. C. C. Atchison, city clk.

Ia., Carroll—Grad., Curb, Gutter—(1) Resol. passed to pave 3rd st. E. with No. 1 standard pav. blks. and laying 6-in. concr. base. (2) Council to consider resol. to pave 1st st. W. bet. 12th-16th avs. (3) Ord. to be considered estab. curb lines on 13th ave. W. bet. C-2nd avs. at 32 ft. wide.

Ia., Algona — Pav. — Resol. passed auth. pav. from Hancock co. line to twn. Wesley. Earl F. Peterson, co. clk.

Ia., Iowa City—Pav.—Will pav. various sts. with vit. pav. brk., asph. concr. pav., standard sheet asph., r. c. pav. or vibrolithic pav.

Kan., Enterprise — Plans prepared paving 18 blocks asphaltic concrete, asphalt and brick.

Kan., Ft. Scott—Bourbon Co. plans surfacing 1¾ mi. Garland Brench Rd., 16 ft., 16,000 sq. yd. bituminous macadam.

Ky., Frankfort — Road repairs and construction in the state, ordered begun this year will represent an outlay of approximately $487,000.

Ky., Clinton Co.—In Clinton County a four and one-half mile macadam road will be built between Albany and Monticello at a cost of about $50,000.

Md., Frostburg—Bids by City Council, Olin R. Rice, to July 23, for street paving. Wm. Harvey, Engr.

Md., Baltimore—Plans for the condemnation, opening, widening and paving of Russell Street from Stockholm Street to Maryland Avenue, Westport, advanced. Ordinance was approved. The street is to have a width of 100 feet. It now is 66 feet wide.

Md., Baltimore—Widening of Fayette Street on the south side from the east side of Gay Street to the west side of Fallsway.

Md., Baltimore—Widening of Frederick Street on the east side from the north side of Lexington Street to a point distant about 49.80 feet northwesterly.

Md., Baltimore—Widening of Lexington Street from Gay Street to Frederick Street.

Mich., Dowagiac—Road contracts to be let this month provide for important links in state trunk lines. The job of paving with gravel nine miles of road, from Williamsville to the southeast part of the county. Supervisors will arrange for paving through the village of Adamsville to complete the roadway from Cassopolis to Elkhart.

Mich., Detroit—Res. to pave 12 alleys and Cortland Ave., Ford Ave., 14th St., Highland Ave. from W. Ave. to La Salle Blvd.

Mich., Detroit—Plans prepared paving Golden Gate Ave. from Woodward to Charleston Sts., $19,780, Lawton Ave. from Blaine to Carter Sts., $3,620, 12th St. from Pilgrim to Puritan Aves., $13,950, Walbridge Ave. from Baldwin to Van Dyke Aves., $5,350, Burlingame Ave. from Nardin to Belleterre Aves., $7,870, Lenox Ave. from point 880 ft. north of Charlevoix to Mack Ave., $13,550, 3½ in. sheet asphalt on 8 in. concrete, also 3 alleys with one course concrete, $16,225.

Mich., Detroit—To pave Woodward Ave. with sheet asphalt and also various alleys in city.

Minnesota—Plans prepared grading 17 mi. Minnesota Trunk Highway 1 from Owatonna to Faribault, Steele and Rice Counties, $100,000; 13 mi. Trunk Highway 2, Clay Co., also 2 bridges, $90,700; 5 mi. Trunk Highway 45 from Stillwater to Lake Elmo, Washington Co., $30,000; concrete paving 1 mi. Trunk Highway 1, Washington Co., $50,000; gravel surfacing 17 mi. Trunk Highway 28 from Morris to Johnson, Stevens Co., $25,900.

Minn., St. Paul—Plans to reconstruct, relay and repair, where necessary, sidewalks at the following locations: W. S. Forest St., beginning 120 feet south of Reaney St., thence south 60 feet; S. S. Grove St., beginning 64 feet east of Jackson St., thence east to Temperance St.; B. S. Hudson St., between Mendota St. and Forest St.; S. S. Cook St., between Forest St. and Cypress St.

Minn., St. Paul—To pave the following streets: Lincoln Ave., from Milton St. to bridge over short line; Goodrich Ave., from Milton St. to Lexington Ave.; Fairmount Ave., from Milton St. to Lexington Ave.; Milton St., from Summit Ave. to Osceola Ave.; Chatsworth St., from Summit Ave. to Osceola Ave.; Oxford St., from Summit Ave. to Osceola Ave., including sewer, water and gas connections from street mains to property lines complete, where not already made; also including curbing and paving alley and driveway approaches.

Minn., St. Paul—Call will be issued this week for bids beginning July 10 on a new list of twenty-nine grading and graveling improvements on the Minnesota trunk highway system, averaging $50,000 each in estimated cost.

Minn., St. Paul—Plans paving Marshall Ave. from Levington to Snelling Aves., $30,000.

Mo., Kansas City—Change of grade, Oak St., 65th St., to 71st St. to 75th St.

Mo., Kansas City—Res. passed to repave 14th St. from Central Ave to Wyandotte with rock asphalt.

Mo., Jefferson City—State Hy. Dept., Jefferson City, plans 9.943 mi. road from Cairo to Poplar Bluff, Federal Aid Project 118, Sect. B., Stoddard Co., 24,670 cu. yd. earth excav., 4,798 cu. yd. borrow, 164.4 cu. yd. concrete masonry, 22,546 sq. yd. gravel surfacing, etc.; 4.256 mi. road from Cairo to Poplar Bluff, Federal Aid Project 179, Stoddard Co., 22,349 lin. ft. grading, 39,732 sq. yd. gravel surfacing, etc.; 4.694 mi. road from Higginsville eastward and westward, State Aid Project 20.164, Lafayette Co., 38,042 cu. yd. earth and 600 cu. yd. rock excav., 288.7 cu. yd. concrete masonry, etc.

Mo., Kansas City—Res. adopted to improve Gd Ave. to Campbell St.

Mo., Kansas City—To repair conc. pvt. on Monroe Ave., from Independence to 9th Ave.

Mo., Kansas City—To const. curbing both sides 61st St., from Prospect to Agnes Aves.

Mo., Kansas City—Res. to repair brick pav. on 25th St. from Fairmont Ave to Mercier St.

Mo., Kansas City—Pav. res.—Roadway of 31st St., Ewing Ave., from 15th St. to 18th St., Farboe St., from 16th St. to 17th St., and 39th St. from Main to Warwick Blvd.

Mo., Jefferson City—Plans ¼ mi. road from Peno northward, Federal Aid Project 188, Pike Co., 9,263 cu. yd. earth excav., 2,056 sq. yd. gravel surfacing, one 80 ft. steel span with five 20 ft. rein.-con. slab span approaches over Peno Creek.

Mo., Gallatin—Plans paving 9 blocks, asphaltic concrete, $40,000.

Mo., St. Clair Co.—Rd. graded earth 3.244 mi., 24 ft. wide; all bids rejected.

N. J., N. Bergen—An ordinance providing for improvement of 36th St., in the Township of North Bergen, County Hudson, N. J., from the east side of Bergen Turnpike to the west side of the Hudson County Boulevard and Midway Place, between 35th St. and 36th St., by grading, curbing, flagging, paving, sewering and draining said street.

N. J., T. S. N. Bergen—An ordinance appropriating the sum of $103,700 for the improvement of Grand avenue, from Hoboken St. to the Paterson Plankroad, and authorizing the issuance of Temporary Improvement Notes therefor.

N. J., Barrington—Drawing plans for sidewalks, curbs and gutters for boro. council, care T. H. Williams, all of Barrington. J. J. Albertson, Engr, Court House, Camden, N. J.

N. J., N. Bergen—An ordinance for the improvement of Sunnyside Ave., from the northerly line of South St. to the southerly line of 23rd St., in the Township of North Bergen, County of Hudson. Sec. 1, that all that part of Sunnyside Ave. from the northerly line of South St. to the southerly line of 23rd St., be improved by grading, curbing, flagging and paving and constructing sanitary and storm water sewers and appurtenances in said street. Sec. 3, by constructing sanitary and storm water sewers and the appurtenances thereto in and along said street.

N. Y., Boro Bronx—Plan to change the grades of the street system in the territory bounded by Longfellow Ave., Lafayette Ave., Edgewater Rd., Halleck St., Spofford Ave., Drake St., Randall Ave., Whittier St. and Spofford Ave., Boro of Bronx.

N. Y., Boro Queens—To change grade Nashville Ave. (Lincoln Rd.-Armida Ave.), 212th St., 110th Ave. (Queens Parkway), Springfield (road) boulevard, 113th Ave. (The Strand), Boundary Line of the City of New York, 121st Ave., 231st St., 129th Ave., 226th St., 130th Ave. and Sears (Vorhis) St., Boro Queens.

N. Y., Boro. Queens—City to acquire title to open and extend North Conduit Ave. from 79th (Genesee) St. to 133d (Blake) Ave., and 133d (Blake) Ave. from North Conduit Ave. to Woodhaven Blvd. (Ave.), in the Boro. of Queens; 25th St. from Jackson Ave. to Patterson Ave., Boro. of Queens.

N. Y., Porter—Board of Supervisors, F. H. Kuril, Court House, Lockport, N. Y., contemplate roadway paving in Porter. T. M. Brennen, Engr., Court House, Lockport.

N. Y., Buffalo—Erie Co. preparing plans paving 3,636 ft. Bailey Ave. south of Main St., 100 ft. wide, concrete or asphalt.

N. Y., Boro Queens—Changing the grades of the street system in the territory bounded by 97th (Beaufort) Ave., 133d St. (Hulst-Nebraska Ave.), 101st Ave. (Broadway), 134th St. (Baker Ave.-Minnesota St.), 105th (Wyoming) Ave. and 130th St. (Maure Ave.), Boro Queens.

N. Y., Bath—Plans $25,000 bond issue to pave Buel, William, Pine and various other streets.

N. Y., Lockport—Niagara Co. soon takes bids resurfacing Shawnee Rd., concrete. $53,174.

N. Y., Oswego—Hall Road to be resurfaced for 1½ miles.

N. Y., Rochester—City to improve 12 avenues and streets by pav., laying sidewalks, resurf. and tree planting.

N. Y., Jamestown—Plans repaving Harrison St. between Winsor and South Main Sts., Lincoln St. between 6th and 8th Sts., 11th St. between Main and Washington Sts., and Fulton St. between 6th and 8th Sts., vitr. brick. To exceed $35,000.

N. C.—St. Hy. Com. to let contracts for over 350 miles new rds., many to be of sand, clay and top soil and conc., in Beaufort, Edgecombe, Halifax, Owen, Iredell, Caldwell and Surrey Cos.

N. C., Raleigh—State highway projects for letting July 25, will add 75 miles of hard-surfaced roads to the state highway system. Ninety-three miles of gravel and sandclay roads also are included in the projects. Hard-surfaced road construction going forward in each of the nine construction districts, touching every general section of the state, now run into the hundreds of miles.

N. C., Charlotte—Bids for the construction of seven miles of permanent, hard-surfaced road in the county are to be received by Lloyd Ross, engineer and general superintendent of the county road work. This work, the cost of which is estimated to be in the neighborhood of $190,000, is to be done on the York road in lower Steel Creek township to the new river bridge.

N. C., Charlotte—Mecklenburg Co. takes bids latter part of July hard surfacing 7 mi. York Rd. $180,000.

N. C., Wilmington—Plans paving various streets, brick and asphalt. $400,000-$500,000.

N. D., Fargo—Pav.—Petn. filed for following extens.: 11th ave., bet. 13th-14th sts.; 10th ave. N., bet. 13th-College; College st., bet. 10th-12th aves.; 14th st., bet. 10th-12th; abt. 85,000 yds. A. R. Watkins. $300,000.

N. D., Fargo—Next year will see more paving work done in Fargo than since 1912. A petition filed at the city auditor's calls for extension of the paved area in the northwest section of the city. The area for which paving is requested is as follows: 11th Ave. N., from the ending of the present paving, between 13th and College Sts. to 14th St.; 10th Ave. N., from the ending of the pavement between 13th and College Sts. to 14th St. N.; College St. N., from 10th to 12th Aves.; 14th St. N., from 10th to 12th Aves. N.; 12th Ave. N., from 13th St. to 15th St.

O., Fremont—Ohio Ave. and connecting streets bonds sold, $118,000; Heschke Rd. bonds, $38,000 sold.

O., Akron—To improve Orlando Ave., grad., drain., pav., sewers and laterals Roslyn Ave., Noeka Ave., Aqueduct St., Home Ave. and others in city.

O., Ashtabula—Sycamore St. repairs.

O., Marietta—Chamber of Commerce working for hard surface roadway from here to Athens co. line, west of Bartlett; matter will be put up to county commissioners and state hgwy. dept.

O., Canton—Massillon Rd. from Canton to Reedurban; commissioners decide to widen by one foot.

O., Westerville—W. Main and S. State St. to be given asphalt treatment.

O., Columbus—Petitions for improvement Stanley Ave., Wildwood Drive, Douglas St. and alley; Gates St. and others.

O., Columbus—Resolution to improve 11th Ave., from High to 4th, re-surf. with asphalt.

O., Greenfield—Highway from Wilmington to Clarksville, 7½ mi., meeting of commissioners, state highway men and farmers decide on brick pavement as opposed to macadam.

O., Hamilton—Several streets, bids July 21.

O., Toledo—Resolution for construction of sidewalk on Bowman St. between Broadway and Prouty Ave. A resolution for the construction of sidewalk on Broadway, between Walbridge Ave. and South Ave. A resolution for construction of sidewalk on Florence Ave., between Stroenlein Ave. and B. & O. R. R.; a stone sidewalk, 5 ft. in width, be constructed on Florence Ave., between Stroenlein Ave. and B. & O. R. R.

O., Columbus—Dept. Highways and Dept. Pub. Wks., Columbus, cancelled all bids, grading, bridging and paving roads in following counties: Clark Co., Sect. "B" Dayton-Longview Rd., 1.545 mi., rein.-conc., bituminous macadam, asphalt or tar; Columbiana Co., Sect. "A-1" Lisbon-Canton Southern Rd., 3.922 mi., brick or bituminous macadam; Pickaway Co., Sect. "F-2" Columbus-Washington C. H. Rd., 0.8 mi., bituminous macadam; Tuscarawas Co., Sect. "A" Canton-Canal Dover Rd., 3 mi., Kentucky rock asphalt, rein.-conc. or bituminous macadam; Tuscarawas Co., Sect. "B" Canton-Canal Dover Rd., 2.299 mi., monolithic brick, rein.-conc., or Kentucky rock asphalt.

O., Lakewood (Cleveland P. O.)—Will sell $14,270 bonds July 17 paving Archdale Ave., $16,160 Baxterly Ave., $17,470 Elbur Ave., $12,350 Overbrook Ave., $38,295 Brown Rd., $15,246 Onondaga Ave., $36,486 St. Charles Ave.

O., Akron—Reso. improving North Main St. (formerly Rider Ave.) from York St. to Cuyahoga Falls Ave., by grading, draining, curbing, paving, constructing sidewalks, planting shade trees and constructing sewer laterals and water service connections.

O., Akron—To improve Dayton St. from Glenwood Ave. to Cuyahoga Falls Ave., by grading, draining, constructing sidewalks and constructing sewer laterals.

O., Toledo—A resolution for the construction of sidewalk on 14th St., between Monroe St. and Washington St. To improve alleys bounded by Ontario St., Chase St., Galena St. and Chicago St., by grading, draining, paving full width, etc. (including alley intersections).

Ohio—Another large distribution of federal funds to aid Ohio road building projects authorized by the United States goods roads bureau. It will make possible the expenditure of $1,522,573 in construction work, of which the federal government will pay $624,040 and the balance of $928,533 will be paid out of state funds. The eight projects to receive federal aid, and the sums allotted to each are: Cleveland-Buffalo highway between Conneaut and Pennsylvania state line; reinforced concrete or brick; length, .606 mi.; cost, $469,073; federal aid, $227,250. Cincinnati-Zanesville Rd., between Wilmington and Cincinnati, Clinton county; brick or concrete; length, 7.545 mi.; cost, $313,000; federal aid, $64,500. Mansfield-Wooster Rd., between Jeromeville and Jefferson, Ashland county; brick; length, 3.468 mi.; cost, $154,000; federal aid, $69,000. Canton-Canal Dover Rd., between Mineral City and Dover, Tuscarawas county; brick or concrete; length, 2.677 mi.; cost, $90,000; federal aid, $37,500. Lima-Wapakoneta Rd., between Lima and county line, Allen county; bituminous macadam, concrete, brick or asphalt; length, 4.043 mi.; cost, $135,000; federal aid, $67,500. Lima-Sandusky Rd., between Lima and Bluffton, Allen County; bituminous macadam or concrete; length, 3.8 mi.; cost, $140,000; federal aid, $61,500. Marion-Galion Rd. between Marion and Galion, Marion county; concrete or bituminous macadam; length, 3.477 mi.; cost, $111,000; federal aid, $43,250. Ohio River Rd., between Salt Run and Brilliant, Jefferson county; brick or concrete; length, 2.677 mi.; cost, $140,500; federal aid, $53,540.

O., New Philadelphia—Dover-Millersburg Rd. through Shanesville, $25,000 bond issue sold.

O., Fostoria—Buckley St., cement, 20 ft. wide, county commissioners to share expense.

O., Caldwell—Caldwell-Lowell Rd. in Olive township, Noble Co., grading and surfacing, hearing by commissioners.

O., Bellefontaine—Ditch improvement in McArthur and Richland Counties, known as Griffin-Fullerton ditch, petition for improvement filed.

O., Wellsville—Several streets, council will enact legislation to resurface.

O., Hillsboro—State highway, 7.55 mi. to be paved probably with brick though alternate bids on bituminous macadam and concrete will be taken.

O., Columbus—Ordinance passed to improve Clinton St., from Fourth St. to the C. C. C. & St. L. Railway, by grading with brick or asphalt, and laying the necessary water services and sewer connections in the city of Columbus, Ohio.

O., Jackson—Chillicothe St., council adopts resolution to pave.

O., Mt. Vernon—W. Gambier and W. Vine Sts., threats of injunction against contract for asphalt pavement by those favoring brick.

O., Cleveland—The following paving projects are pending: Lima—Road from Elida to Scott's Crossing, $84,600; bonds sold.

O., Pomeroy—Sec. L of Pomeroy-Athens Rd., commissioners determine on concrete, state highway dept. assents.

O., Fostoria—N. Union St., council starts legislation.

O., Toledo—Improving of Woodville St., from East Broadway to end of street car line, by grading and repaving; for the improving of Ashland Ave., from Adams St. to Collingwood Ave., by grading and repaving that portion; for the improving of Broadway, from South Avenue to N. Y. C. Bridge, by grading and repaving that portion.

O., New Philadelphia—County Engineer Fiedler is preparing plans and estimates for piking 3,025 ft. of roads in Bucks and Auburn townships.

O., Washington C. H.—Front St., New Holland, O., is to be paved, $2,500 in bonds are to be issued.

Pa., Cleveland—Frank R. Lander, county surveyor, will prepare an estimate of the cost of extensions in the filing facilities in the county recorder's office.

Pa., Phila.—An ordinance to revise lines and grades of the northwesterly side of Green lane, from the center of Boone St. to eighty ft. northeastwardly.

Pa., Swoyerville—New plans drawn for paving for boro. council, James Chesluk, Swoyerville. Young & Wintermute, Engr., 2nd Nat'l. Bank Bldg, Wilkes-Barre, Pa. Owner will take bids on gen. contr. in early July.

Pa., Pittsburgh—City Council, W. A. Magee, City-County Bldg., contemplate grading, regrading, paving, repaving, curbing, recurbing, to cost $112,000. Chas. M. Reppert, Engr., City-County Bldg.

Pa., Lancaster—Drawing plans for paving for City Council, Simon Shissler, and will take bids on gen. contr. about Aug. 1. James Maline, Engr., City Hall.

Pa., Phila.—An ordinance to widen Locust St., from Juniper to Watts St.

Pa., Phila.—An ordinance to authorize the opening of Rising Sun Ave., from Bristol St. to Wyoming Ave., to its full width.

Pa., Phila.—An ordinance to pave 58th St. from Woodland Ave. to the Baltimore and Ohio R. R.; a 24 ft. strip of split granite block on a concrete base be laid in the bed of 58th St., from Woodland Ave. to the Baltimore and Ohio R. R.

Pa., Erie—An ordinance laying out, opening and extending Pear St. as a fifty (50) ft. thoroughfare; laying out, opening and extending Sterrett St. as a fifty (50) ft. thoroughfare; laying out, opening and extending Riblet St. as a 50 ft. thoroughfare and impvts. to various streets in city.

S. C., Camden—Takes bids latter part of July, extending various streets, $200,000.

S. D., Yankton—Grav.—Yankton Co. contemp. for Sunshine Hgwy. between Yankton-Gayville.

Tex., Coleman—Coleman Co. making plans grading, gravel surfacing, etc., 10.58 mi. State Highway 7-A, Federal Aid Project 303, incl. 44.9 acres clearing and grubbing, 49,678 cu. yd. borrow, 21,670 cu. yd. roadway, 4,007 cu. yd. loose and 4,295 cu. yd. solid rock excav., 1,685 cu. yd. concrete, 187,050 lb. reinforcing, $87,477.

Tex., Denison—July 26, to vote on $65,000 bond issue for additional street paving.

Tex., Brownsville—Cameron Co. making plans grading and paving with 2 course concrete 10.47 mi. State Highway 12 between here and San Benito, incl. 110,700 sq. yd. concrete. $406,866.

Tex., Cleburne—Johnson Co. plans surfacing 23 mi. Meridian Highway from Burleson south through Cleburne. $225,000 bonds voted, and $200,000 allotted by State Highway Comn. for project. J. G. Lott, Alvarado, engr. in charge.

Wash, Seattle—East Pacific St., from the west margin of 11th Ave. northeast to the existing pavement at a point approximately 500 feet east of the east margin of 15th Ave. northeast; and 11th Ave. northeast, from Pacific St. to East 40th St., by paving the same.

Wash., Seattle—For the improvement of Corson Ave., from Myrtle St. to Duwamish Ave; Carleton Ave., from East Marginal Way to Bailey St.; Flora Ave., from Myrtle St. to Bailey St.; East Marginal Way, from Carleton Ave. to Myrtle St.

Wash., Seattle—East 46th St., from 22nd Ave. northeast to a point one hundred twenty-five (125) ft. east of the east line of Campus Addition, Seattle; all in the city of Seattle, by grading.

Wash., Seattle—Wilson Ave., from Holly St. to Grattan St.; Grattan St., from Wilson Ave. to Rainier Ave, etc.

Wash., Seattle—East Columbia St., from 12th Ave. to 13th Ave.; East Cherry St., from 11th Ave. to 13th Ave., and East James St. and Barclay Court, each from 12th Ave. to 13th Ave.

Wash., Seattle—Improvement ordinance of Florentia St., from Westlake Ave. North to Nickerson St.; Garden St., from Rainier Ave. to 46th Ave. South; all in the City of Seattle, by the construction of sewers and side sewers, together with appurtenances necessary for the proper sewerage and drainage of said district, under Ordinance No. 43051, as the same now stands, be, and the same is, hereby in all things approved and confirmed.

Wash., Wenatchee—Chelan Co. soon takes bids grading 4 mi. Blewett Pass Highway. $100,000.

Wash., Tacoma—Plans resurfacing 17 blocks Bway. and St. Helens Ave. from South 17th to Division Ave., bitulithic.

Wash, Seattle—Local impvt. on East 46th St., East Pacific St., Wilson Ave., Grattan St., grad. conc. sidewalks and curbs.

Wash., Tacoma—Resolution to order laying of concrete sidewalks on South 55th St. from Sheridan to Cushman Ave. L. I. D. 1280.

Wash., Tacoma—Resolution to order the grading and paving of Madrona Way from Mason Ave. to north line of Mason Heights, Tacoma, Wash.; also to construct sanitary sewers.

Wash., Tacoma—Resolution to lay cement sidewalks on South 9th St. from Lawrence to Union Ave.

Wash., Tacoma—Resolution to order grading of North 51st St. from Pearl St. to Vassault St. L. I. D. 752.

Wash., Tacoma—Council to order grading of Tacoma Ave. from South 46th to South 48th Sts.

W. Va., Wheeling—July 29, by Comrs. Ohio Co., rein.-conc. surfacing ¾ mi. Glenns Run Rd., 16 ft. $25,000.

W. Va., Clarksburg—July 25, paving 28 streets. $200,000. T. Long, City Engr.

W. Va., Huntington—July 20, by Comrs. Cabell Co., grading and hard surfacing Barboursville, Seven Mile and Long Branch Wayne Rds.

W. Va., Moundsville—July 20, paving with cement, brick or block Jefferson and Marton Aves., 9th and 4th Sts. $50,000.

Wis.—The Beaver Dam-S. Beaver Dam Rd., 1.51 mi., low bidder, Schreiber & Waterworth, Randolph, Wis., at the following prices: Clearing and grubbing, .10 acres at $250, $25; excav. earth, 7,178 cu. yds., at .47, $3,373.66; concrete surfacing, 9 ft., 8,511.1 sq. yds. at $1.30, $11,064.43; joints, 8,511.1 sq. yds., at .02, $170.22; cement in place, furnished by county, 2,900 bbls. at .10, $290; concrete Class A, culverts, 54.31 cu. yds., at $14.50, $787.50; guard rail, 130 lin. ft., at .50, $65; 3.5 ft. gravel shoulders, 6,269 sq. yds. at .55, $3,447.95. Total, $19,223.76. If cement is furnished by contractor, $24,820.76.

Wis., Monroe—Beloit St., City of Monroe. Low bidder on this job was J. T. Blake, of Madison, but his bid contained a rider to the effect that this and another job had to be let to him at the same time or he would not accept any. Due to this rider, it is considered that the McCusick Construction Co., of Minneapolis, Minn., is low bidder at the following prices: Excav., earth, 3,000 cu. yds., at .50, $1,500; concrete surfacing without joints, 8,200 sq. yds., at $1.33, $10,906; cement in place, 2,800, at .18, $504; concrete Class A culverts, 21 cu. yds., at $17, $357; pavement with joints, 8,200 sq. yds., at .02, $164; cement by contractor, 2,800 bbls., at $2.44, $6,832. Total cement furnished by county, $13,389. If furnished by contractor, $20,252.

Wis., Monroe—The McCusick Construction Co., Minneapolis, Minn., was low bidder on the Monticello-Monroe Rd., Green County, at following prices: Excav., earth, 12,000 cu. yds., at .70, $8,400; solid rock, 3,000 cu. yds., at $2.10, $6,300; borrow, 200 cu. yds., at .70, $140; joints in pavement, 30,000 sq. yds., at .02, $600; concrete pavement, 30,000 sq. yds., at $1.38, $41,400; cement in place by county 10,250 bbls., at .18, $1,845; Class A concrete culverts, 104 cu. yds., at $17, $1,768; in bridges, 70 cu. yds., at $20, $1,400; guard rail, 600 lin. ft., at .45, $270; 18 in. corrug. iron pipe, 70 lin. ft., at $1.40, $98; cement, if furnished by contractor, 10,250 bbls., at $2.44, $25,010. Total, if county furnish cement, $62,221. If contractor furnish cement, $85,386.

Wis.—The New Glarus-Monticello Rd. Green County: Clearing and grubbing, 6 acres, at $150, $900; excav., earth, 26,600 cu. yds., at .56, $14,896; loose rock, 2,000 cu. yds., at $1.20, $2,400; solid rock, 6,700 cu. yds., at $2.25, $15,075; borrow 700 cu. yds., at .60, $420; joints in pavement, 54,200 sq. yds., at .02, $1,084; concrete surfacing without cement and joints, 54,200 sq. yds., at $1.36, $73,712; cement in place, 19,000 bbls., at .22, $4,180; concrete Class A culverts, 318 cu. yds., at $17.50, $5,565; in bridges, 303 cu. yds., at $24, $7,272; guard rail, 1,600 lin. ft., at .50, $800. Total, without cement, $126,304. Total, with cement furnished by contractor, 19,000 bbls., at $2.48, $47,120, $169,244.

Wis.—The main street, Village of Clyman, 0.47 mi., low, Morris Martin, Berlin, Wis., at following prices: Excav., earth, 1,008 cu. yds., at $1.10, $1,108.80; borrow, 56 cu. yds., at $1.10, $61.60; joints in pavement, 5,192.2 sq. yds., at .02, $103.84; concrete surfacing, 18 ft., 5,192.2 sq. yds., at $1.35, $7,009.47; cement in place, 1,750 bbls., at .20, $350; concrete Class A culverts, 17.71 cu. yds., at $20, $354.20. Total, $13,467.91, on condition of county furnishing cement. If contractor furnish cement, 1,750 bbls., at $2.56, $4,480, $17,591.91.

Wis.—The Juneau-Watertown Rd., 4.54 mi. Low, Morris Martin, Berlin, Wis., at following prices: Excav., unclassified, 15,000 cu. yds., at .75, $11,250; borrow, 900 cu. yds., at .75, $675; joints in surfacing, 48,200 sq. yds., at .02, $964; concrete surfacing, 48,200 sq. yds., at $1.35, $65,070; cement in place, 16,200 bbls., at .20, $3,240; concrete Class A culverts, 110 cu. yds., at $20, $2,200; guard rail, 100 lin. ft., at .55, $55; steel in joints, 200 lbs., at .04, $8. Total, $83,462. If cement furnished by contractor, 16,200 bbls., at $2.56, $121,694.

Wis.—The Beaver Dam-Columbus Rd., 6.54 mi. Low if county furnish cement. Paul C. Kroeck Construction Co., Milwaukee, Wis., at following prices: Excav. unclassified, 23,483 cu. yds. at .75, $17,612.25; borrow, 479 cu. yds., at .75, $359.25; joints in pavement, .02, $1,404.67; concrete surfacing, 70, 233.4 at $1.38, $96,922.09; cement in place, 23,850 bbls. at .20, $4,770; concrete Class A culverts, 181.71, at $20, $3,634.20; in bridges, 104 cu. yds., at $20, $2,080; steel in pavement, 200 lbs., at .04, $8; guard rail, 300 lin. ft., at .60, $180; 1 angle iron 18 ft., $1, $18; two 12 in. corrug. pipe, 70 lin. ft., at $2, $140. Total, $127,128.46. If cement is furnished by contractor, 23,850 bbls., at $2.60, $184,368.46.

Wyo., Sheridan — Road — Contemp. constr. 8 mi. trail from Story into Penrose pk.

SEWERAGE AND SANITATION

Ala., Huntsville — The Merrimack Manufacturing Co. has begun the installation of a complete sewerage system in the village of Merrimack, to cost $50,000.

Calif., San Francisco—Taraval St., btween Thirty-seventh and Forty-eighth Aves., by the construction of sewers.

Calif., San Francisco—The following street work was ordered: Hollister Ave., between Hawes and Griffith Sts., by the construction of a sewer.

Ill., Western Springs—Drawing plans for system of sewers for vil. council, H. A. Reed, of Western Spring. C. W. Breed, Archt., Western Springs. Edwin Hancock, Consultg. Engr., 2047 Ogden Ave., Chicago.

Ill., West Chicago—Drawing plans for water and storm sewers connections for city council, E. J. McCable, both of West Chicago. Edwin Hancock, Archt., 2047 Ogden Ave., Chicago, Ill.

Ill., Posen — Drawing plans for sewers in Posen to cost $100,000 for vil. council, Postoffice, Harvey, Ill. Edwin Hancock, Engr., 2047 Ogden Ave., Chicago, Ill.

Ill., Long Lake—Plans drawn for drainage to cost $76,000 for Long Lake subdist., all of Long Lake. Sheppard & Morgan, Engr., Edwardsville, Ill.

Ill., Beardstown—City council, Wesley Perry, contemplate sewer and pumping plant. Godill & Millard, Engrs.

Ill., Chicago—To build sewers on S. Sawyer Ave., from Archer Ave., S. Spaulding Ave. to W. 45th, with inlets and pipe sewer in W. 45th St.

Ill., Chicago—Tile pipe sewer in Goodman St., from Edmunds N. W. to Indiana boundary line.

Ill., Chicago—Calumet Ave., South line E. 56th St. to North line E. 61st St., concrete curbs and gutters, and grade with Type B asphalt.

Ind., Indianapolis—Local sewer improvement resolution No. 10147, Brookville Rd., from south property line of Washington St. to center of Moore Ave.

Ia., Sioux City—Storm Sewer—N. W. Grand View Park, 2,000 lin. ft. clay pipe, 20 catch basins. City Engr., L. N. Hintgen, City Bldg., making plans. City Clk., F. A. Garnsey. $4,160.

Ia., Kalona—San. Sewer Sys.—Ready for bids soon. Consult. Engr., W. E. Buell & Co., Davidson Bldg., Sioux City.

Ia., Glidden—San. Sewer Sys.—Plans in progress. Consult. Engr., W. E. Buell & Co., Davidson Bldg., Sioux City.

Ky., Madisonville — Drawing plans for sanitary sewer system to cost about $65,000 for city council, B. M. Brooks. Geo. Flannagan, Engr., City Bldg.

Ky., Lebanon—Six mi. of project No. 1 from the city limits of Lebanon toward Campbellsville, a bridge across Rolling Fork of the Green River, and repair of six and one-half mi. of the Georgetown pike in Franklin County also were ordered gotten under way. The total cost will be $35,000.

Ky., Smithland—Grade and drainage project, Smithland to Marion, a distance of 25 mi., will be carried out under federal aid. Work will begin the latter part of year and will be completed next year. The cost of this project will be $327,000.

Ky., Union Co.—A 14 mi. drain and drainage project in Union County, from Morganfield to the Crittenden County line, costing about $75,000, also was ordered begun this year.

Md., Glen Burnie — Town Council, care Walter Monroe, engr., Court House, Annapolis, Md., contemplate sewerage system in Glen Burnie, and sewerage system in Linthincum Heights, Md.

Mich., Saginaw — County commissioners, Emil Roetke, commissioner, Saginaw, taking bids to July 31 for drain in Birch Run, Mich.

Mich., Pontiac — Plans drawn for Adams Ave. drain in Troy and Bloomfield Twps. for county drain commissioner, Cassius J. Crawford, Court House, Pontiac, Mich.

Mich., Grand Rapids—Construction of a sewer in Horton Ave. from Alger St. to Withey St., including the construction of the necessary manholes, catch basins, Y branches and sewer laterals is a necessary public improvement.

Minn., Stewart — Plans drawn for sewer system to cost $40,000 for vil. council.

Minn., St. Paul—A written proposal for following improvement: Construct a sewer on Eleanor St., from West Seventh St. to Chatsworth St., having been presented to the council.

Minn., Rochester—Bids rejected for city council, A. F. Wright, clk., for sewer.

Mo., Kansas City—Resolution for sewers in Locust, Oak, 62nd, McGhee and 61st Sts., and other laterals to join main line.

N. Y., Boro Manhattan—Sewer in Reade St. from West St. to Washington.

N. Y., Boro Bronx—Resol. to construct sewer in Mayflower Ave. from Westchester Ave. to Middletown Rd. and Roberts Ave. from Westchester Ave., to Edison Ave., Boro of the Bronx; Pilgrim Ave., between Roberts Ave. and Middletown Rd., Boro of the Bronx.

N. Y., Boro Brooklyn—Resol. proposals, Avenue T, East 39th St, Avenue D, and East 17th St., Boro of Brooklyn, grading, curbing, paving, flagging, sewers, etc. (Cal. No. 125); (a) regulating, grading, curbing and flagging Avenue T from West 12th St. to West 7th St., adopted; (b) sewers in East 39th St. between Clarendon Rd. and Avenue D, in Avenue D, between East 40th St. and East 37th St. with a temporary connection at Avenue D and East 37th St.; (c) regulating and paving with permanent asphalt East 17th St. from Avenue S to Avenue U, adopted by the Local Board of the Ocean Front District May 24, 1922.

N. Y., Rochester—To build, sewers and storm outlets in Pullman Ave., Emerson Pl., Chatham St. and Knickerbocker Ave.

O., Struthers—A bond issue of $30,014 to cover the cost of grading and sewer improvements this summer.

O., Marietta—Sanitary and storm sewers embodying the use of part of a natural waterway in Oakwood St., Cross Ave. and Glendale St. Bonds aggregating $14,487 authorized.

O., Columbus—Seven miles of new road are to be built and two bridges erected. Engineers Hoover, Simpson and Gregory accompanied the party.

O., Fostoria—The sewage disposal plant is again shut down for repairs. The state board of health has issued certain orders for improvement to this plant which may mean a bond issue of $60,000.

O., Columbus—Resolution adopted to proceed with the construction of a sanitary sewer in Dunedin Rd., from Northmoor place to alley west of High St.; Torrence Rd., from Dunedin Rd. to Indianola Ave.; Milton Ave., from Dunedin Rd. to Northmoor place; alley west of High St., from its southern terminus south of Dunedin Rd. to North corporation line; High St., from Dunedin Rd. to North corporation line; Brevort Rd., from High St. to Indianola Ave.; Piedmont Rd., from Torrence Rd. to Indianola Ave.; Indianola Ave., from Torrence Rd. to Brevoort Rd.; Beech Hill Ave., from Torrence Rd. to Brevort Rd.; and manholes in (right-of-way to be dedicated) between Oakland Park Ave. and Dunedin Rd., and Dunedin Rd. and Torrence and Brevoort Rds., extending from the alley east of High St. to Indianola Ave., where old sewer is constructed, in the city of Columbus, Ohio.

O., Hamilton—Resolutions of necessity for the construction of sanitary sewers and house connections in a number of streets at an aggregate estimated cost of $17,945.

O., Greenfield—The city solicitor will prepare legislation for the construction of a sewer to extend from the school grounds to Paint Creek.

O., Cleveland—An emergency ordinance to expend a sum not to exceed two hundred and thirty-seven thousand ($237,000) dollars for the construction of sewers.

O., Van Wert—Bonds in the sum of $392,000 for a sewer system and sewage disposal plant will be voted upon August 8.

O., Ashtabula—The preliminary steps to provide for a complete sanitary and storm sewer collection system and sewage disposal plant at a cost of $1,000,000.

S. D., Yankton—Bids in July 17, for $42,000 sewerage bonds. John W. Summers, City Aud.

LIGHTING AND POWER

Ark., Russellville—Will appoint commissioners for the water and light improvement district, now being formed for the purpose of building and operating a municipal water and light plant.

Ind., Connersville—Power plant to be improved, between $150,000 and $200,000 to be spent on project.

Minn., Randall—Elect July 18 to vote $15,000 light bonds. H. E. Rutters, Vil. Clk.

Minn., St. Paul—Light company directed to extend its electrical lines by erecting poles and stringing wires for the transmission of electricity in the following alleys and streets: Install 12 poles, one on the southwest corner of Como and Park Aves., one on the west side of Park Ave., just north of Como Ave., one on the west side of Park Ave., just north of Como Ave., one on the southwest and northwest corners of Park Ave. and Winter St., and eight on the north side of Winter St., between Park Ave. and Capitol Ave.

Neb., Kennard—Spcl. elect. for $5,500 light sys. and pav. bonds. Owner, City, care Clk.

N. Y., Cohoes—Bids for hydraulic turbines, water wheel driven generators and other electric equipment for installation in the new Crescent power house at Cohoes were opened. The bids were received under two contracts. The S. Morgan Smith Co. of York, Pa., was the low bidder on the contract for installing two hydraulic turbines with governor equipment and extra parts, with a bid of $92,957. The other two bidders on the same contract were the William Cramp & Sons Ship and Engine Building Co. of Philadelphia, $124,000, and the Wellman-Seavor-Morgan Co. of Cleveland. The engineer's estimate was $80,000.

O., Cleveland—To install electric lights at the following places: Trent Ave. south from Fulton Rd. to about 150 ft. west of W. 41st St.; west side of Fulton Rd. at Newark ct.; west side of W. 25th St. at Buckeye ct.; at the intersection of E. 144th St. and Benwood Ave.; at the intersection of E. 146th St. and Benwood Ave.; Miles Ave. and E. 147th St; Miles Ave. and Lotus Dr.; Miles Ave. and E. 151st St.; one additional light on E. 128th St., between Kinsman and Luke Rd.; remove the electric light at about 3300 E. 126th St. to the intersection of E. 126th St. and Luke Rd.; one additional light on E. 126th St., between Kinsman and Luke Rd.

O., Toledo—Resolution to improve by lighting with electric light, Moore St. between Chestnut St. and Mulberry St.

O., Cleveland—An ordinance to expend a sum not to exceed $150,000 for erecting, enlarging and extending the municipal electric light and power distribution system of the division of light and power, department of public utilities.

O., Fremont—Safety-Service Director E. H. Russell has been authorized to advertise for bids for street lighting.

O., La Rue—Citizens will vote at the primary election Aug. 8 on a $25,000 bond issue for covering the cost of providing a 24-hour light and power service for this village.

O., Athens—The village of Albany has taken steps toward the intsallation of a lighting system by entering into contract with C. Y. Bridgeman in connection with the P. & M. Electric Co. of Athens for the construction of an overhead system carrying a 2,300 volt primary line and a secondary line.

O., Cleveland—An ordinance to expend a sum not to exceed $50,000 for the purpose of erecting, enlarging and increasing the number of service connections of the municipal electric light and power system of the department of public utilities.

S. D., Cavour—Bids for $10,000 electric bonds. Owner, Town, L. A. Huhn, Clk. Bd. of Trustees.

S. D., Watertown—Special election to vote $225,000 power plant bonds. Brownie Mather, City Clk.

S. D., Sioux Falls—Resolution passed for $25,000 electric light bonds. Walter C. Leyse, City Aud.

Va., Newport—Page Power Co. organized with $3,000,000 capital to develop waterpower on the Susquehanna River. A 500-ft. dam with power house and an initial installation of machinery for generating 1,800 horsepower to be transmitted by electricity is planned.

Wash., Tacoma—Ordinance authorizing and directing the Comr. of Light and Water to proceed to prepare detailed drawings, plans and specifications for construction of Hydro Electric Power Unit No. 2 and appropriating the sum of $29,000 therefor.

Wash., Tacoma—Resolution for franchise for construction of high tension electric line to connect power plants of Seattle and Tacoma, and for construction of a transmission line of the Cushman power plant from Mason Co. line to City of Tacoma.

Wash., Tacoma—Providing installation of a system of street lighting on South Yakima from Columbia Ave. to South 48th St.

Wis., Baraboo—G. McCarthen Co. plans 1 story hydro-electric power plant, brick and rein.-conc. $45,000. Architect not selected.

WATER SUPPLY

Ind., Bloomington—To issue bonds to raise $100,000 to build another dam in the Leonard mill valley, to add to the present city water works system.

Ind., Bloomington—The city council has voted for the construction of a reservoir to cost $100,000 to increase the city's water supply.

Ia., Oskaloosa—Awarded to R. M. Grant & Co., 111 W. Monroe, Chicago, $230,000 water bonds.

Ia., Clinton—Awarded to Bechtel Bond Co., Davenport, $10,000 bonds for well.

Kan., Nortonville—Plans prepared for waterworks and sewers.

Kan., Hartford—Plans complete new waterworks and sanitary sewers. E. T. Archer, 209 New England Bldg., Kansas City, Mo., Engrs.

Mass., Springfield—Election held recently in Springfield, voted 160 to 25 in favor of a bond issue for the purpose of extending the water works system.

Mass., Waltham—The city council voted the sum of $5,700 for water works service extension.

Mich., Monroe—Advertise for sealed bids for $200,000 municipal water company bonds and $100,000 storm sewer bonds, to be opened July 24.

Mich., Detroit—Resolution that an 8-inch main be laid in Whittier, from north of Waveney to south of Brunswick, a distance of 2,150 ft.

Mich., Detroit—Res. that a 6-inch main be laid in Kensington, north of Brunswick, a distance of 540 ft., and owners of lots 18-25 inc., 59-67 inc.

Minn., Shakopee—Bids in July 11 for $10,000 water bonds. E. A. Mahowald, City Clk.

Mont., Conrad—Bids in July 10 for $180,000 water bonds. F. R. Bailey, City Clk.

Mont., Glendive—Making plans extensions to waterworks. $60,000. A. Colin, Clk.

Neb., Columbus—Election July 11 to vote $30,000 waterworks system bonds and $5,000 sewer extension bonds. Wm. Becker, City Clk.

Neb., Sterling—It is expected that work will shortly be commenced upon the new water works system of Sterling, Neb. The bond for providing the necessary funds have been sold.

N. J., Asbury Park—The city of Asbury Park is to spend some $108,000 in the extension of its distribution system in order to improve the fire protection and provide a better domestic water supply.

N. J., Swedesboro—A vote to purchase the water system of Swedesboro, N. J., passed by a majority of 134 votes in a total of 352.

N. Y., Jamestown—Dept. Water and Light plans 16 in. iron main in Harrison St., from Winsor to Sprague Sts. $30,000-$40,000. L. Bergman, City Engr.

N. Y., Canandaigua—Plans to construct mains incl. 2½ mi. 16 in. pipe from reservoir. $656,000.

N. C., Lincolnton—Takes bids latter part of July, water and sewer extensions. $75,000. Carolina Eng. Co., Wilmington, Engrs.

N. C., Wilmington—Plans to remodel filter plant and pump station, also construct new pipe line to Toomeys Creek, and 48 in. main under Cape Fear River. $400,000. Carolina Eng. Co., Wilmington, Engrs.

O., Hillsboro—The council has authorized the issuance of $40,000 in bonds for making improvements in the city water works system.

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O., Canton—Plans for the construction of a 55 mi. 130,000 volt steel tower transmission line between Warren, Alliance and Canton on the property of the Ohio Public Service Co., a subsidiary of the Cities Service Co., are announced by officials of the company. This involves the expenditure of several million dollars. In addition, plans call for the installation of a 20,000 kilowatt turbine at the Edgewater plant at Lorain and a new 30,000 kilowatt turbine in the Toledo Edison Co. plant at Toledo.

O., Cleveland—A crack has been discovered in the coagulating basins at the Division Ave. filtration plant. It may be that the plant will have to be closed down for repairs.

O., Dayton—A bond issue of $850,000 to $900,000 for the elimination of the hydraulic in East Dayton and the establishment of parks and playgrounds there and in other sections of the city is being considered.

O., Columbus—City Attorney Leach has conducted the councilmen over the region of the O'Shaughnessy dam. Approximately 1,000 acres are yet to be purchased by the city for the new reservoir.

O., Cleveland—To proceed with the construction of a water main and its appurtenances in Lenacrave Ave. S. E., between 761 ft. E. of E. 116th St. and 139 ft. E. of E. 123rd St.

O., Bucyrus—To vote at the November election the question of buying the Bucyrus water works. The company has offered to sell for $550,000, but the council thinks that a better price can be had.

O., Ashland—The Ohio Public Service Co. will immediately begin the construction of a new power line from Lorain to Ashland. The line will be insulated for 132,000 volts and will be of steel tower construction.

O., Hubbard—The board of public affairs will advertise for bids for the extension of water mains on a number of streets.

O., Coshocton—The engineering firm of Taylor & Owens of this city will be employed for the purpose of devising a comprehensive plan for sewerage and sewage disposal and for a water supply in West Lafayette.

O., Columbus—Franklin Co. making plans waterworks system in Clinton Twp. Dist. 2, 12,630 ft. 6 in. cement, 3,570 ft. 8 in. wood and 2,540 ft. 12 in. c.i. pipe, etc. $40,000.

O., Rome—Making plans 13,500 ft. c.i. mains in Perry Twp. Dist. 1. $30,000.

O., Toledo—Commissioner of Purchases and Supplies is authorized to enter into contract or contracts for the furnishing and delivering of chemicals for the use of the Filtration Plant, Division of Water, Department of Public Service, for the remainder of the year 1922 and for the year 1923, of the following kinds and amounts, to-wit: 10 tons liquid chlorine, 1,500 tons aluminum sulphate, 1,500 tons iron sulphate, 1,500 tons hydrated lime.

R. I., Providence—To construct an aqueduct three and one-third miles in length, the inside diameter of which will be seven feet nine inches, to connect the new Providence, R. I., water supply with the distribution system of the city. The plans as advanced by the board of water supply of the city call for an expenditure of approximately $1,000,000.

Tex., Oak Cliff—Improvement to insure Oak Cliff against a shortage of water was announced by Water Commissioner. A million-gallon reinforced concrete storage basin will be constructed as soon as plans are drawn. Provision has already been made for the permanent main across the river.

Utah, Ogden—The city commission authorized the extension of water mains for thirty-four blocks to cost approximately $150,000.

Wis., Taylor—Plans prepared building and equipping 1 story, pumping station, brick, rein.-conc. and steel, plain foundation. $60,000.

FIRE

Ill., Spring Valley—A request for an appropriation of from $12,000 to $15,000 to purchase a fire truck was made to the Princeton council by a committee of firemen.

Ind., Terra Haute—Plans are considered for fire alarm system.

Ind., Ligonier—Mayor Denning and members of the city council are considering the installation of a new fire alarm system at a cost of $3,000.

Ind., Jeffersonville—The Louisville Cement Co., located at Speeds, Ind., ten miles north of here, with a $2,000,000 plant suffered a $350,000 fire loss July 13.

Ind., Versailles—Receive sealed proposals to Aug. 4 for $1,000 in bonds for the purpose of purchasing a fire hose truck and other fire apparatus.

Ind., Mooresville—Town threatened by fire which broke out in the garage and repair shop of Robert Harvey. The local plant failed to give a supply of water or an electric current sufficient to sound the alarm. Two hundred men and women fought the fire with buckets. The Indianapolis fire dept. was appealed to and sent a chemical truck in time to assist in checking the flames which by the best of luck kept the fire loss down to $4,000.

Mich., Flint—Taxpayers will be asked to vote a bond issue at the September primaries for the erection of two new fire stations.

Mich., Meno Mince—A special committee of the city council are drafting plans for the new central fire station proposed for erection at Ogden Ave. and Main St.

Minn., Hibbing—This village, care of J. P. Murphy, city building, will be ready for figures July 28, on a $100,000 fire dept. building and auditorium Pressed brick, 2 stys. and basement 90x90 ft. Holstead & Sullivan, Palladio Bldg., Duluth, Minn., are the architects.

Mo., St. Louis—Plans drawn for remodeling and equipping the fire station at Koch hospital, Koch, Mo., at a cost of $75,000.

Mont., Baker—L. M. Corbitt the marshal to install hydrant and hose at the pump house.

Mont., Missoula—Chief Cranney to advertise for bids for 1,500 ft. 2½ in. hose, a gas mask and a cellar nozzle.

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243 WEST 39TH STREET NEW YORK, N. Y.

N. Y., Glens Falls—The proposed new fire truck, the purchase of which was authorized at the village election in March, discussed.

N. Y., Syracuse—Commissioner of Public Safety James B. Spencer has asked Mayor Walrath to provide funds for the purchase of several pieces of fire apparatus.

N. Y., Canastota—At a special election the people of Canastota voted to appropriate $14,500 for a new combination fire engine.

N. Y., Ellicottville—Village seeks appropriation for fire truck, $1,900.

N. Y., Woodbury—City has voted to buy two motor fire trucks.

N. Y., Mechanicsville—At a special election taxpayers voted $14,000 for fire apparatus. The vote was 221, and against 40.

N. Y., Riverhead—Fire commissioners will ask the taxpayers for an appropriation of $10,000 for motor apparatus.

N. Y., Greece—Residents of the Ridge Road fire district voted to pay $10,000 for fire truck, with triple combination equipment.

N. Y., Attica—Village trustees are planning on purchase of motor driven fire truck.

N. C., Weaversville—Town is planning to form fire department.

N. Y., La Salle—Vote on bond issue of $4,000 for purchase of new fire truck hose and chemical truck.

N. Y., Allegany—Village board has decided to purchase a new fire truck.

N. Y., Harrison—The taxpayers of Harrison, N. Y., have voted $75,000 for building and grounds for a new fire station.

N. Y., Utica—To make improvements and changes in the Gamewell Fire Alarm system in this city and for additional fire alarm boxes a bond issue of $50,000 will be asked of the voters.

N. Y., Larchmont—Construction of a fire house at a cost of $65,000, at Larchmont. Eggers & Mirk, 17 West 46th St., New York City, architects.

Okla., Oklahoma City—Bob Parman, commissioner of public safety, is contemplating the purchase of a truck, specially made to carry four passengers and a tank, for the use of the fire chief in making fire calls. A high-powered touring car is now used. Parman says no ordinary touring car is strong enough to stand the abuse. The truck is to be traded for the touring car, and the city will pay $3,000 difference.

O., Lima—The Lima fire dept. has saved a large farmhouse belonging to Ed. Bruning, a mile and a half northwest of the city. As it was, a barn costing $3,000 was burned.

O., West Park—Will probably take bids soon on the construction of a $50,000 fire station. The architect, Randall F. Medious, 287 Crandall St., Youngstown, O., is finishing the plans.

O., Dayton—This city and the outlying suburb of Oakwood have reached an agreement by which Dayton will afford fire protection to Oakwood upon the payment monthly by the village of $250 to the city.

O., Mansfield—Ordinance passed to provide purchase of apparatus and supplies for fire department.

O., Cleveland—Wilbur L. Nichols, director of public safety of West Park City, this county, will open bids for the purchase by that city of one 750-gallon triple combination pumping engine and truck, according to specifications on file in his office. Certified check $500.

O., Cleveland—The city of West Park, this county, has sold $50,000 in bonds for the erection of a new fire station in that city. Work will begin soon.

O., Cuyahoga Falls—Chief Myron E. Harrington has asked the city authorities to purchase an additional fire truck for the fire dept.

O., Waterville—Fire engine bonds of the said village of Waterville, O., in the aggregate sum of $300,000.

Pa., Greenville—The borough council has bought 1,000 ft. of fire hose for $1,200 from the B. Lateral Fire Hose Co., of Chicago. Four bids for a motor pumper have been received ranging from $9,500 to $12,000.

BRIDGES

Fla., Fort Pierce—Proposal to issue $125,000 bonds for construction of a bridge across Indian River at Jensen, 15 miles south of Fort Pierce, will be submitted to the qualified voters.

Ind., Deer Creek—The commission plans for a bridge about 280 ft. long over Deer Creek, comprised of four arches and standing 42 ft. above low water. The bridge is estimated to cost $50,000 and will be one of the handsomest concrete structures in the State.

N. J., Burlington—The bridge will be financed by a company known as the Island Beach Development Co., which was organized at Island Beach. The papers were filed with the Secretary of State on Monday. The company is capitalized at $125,000.

N. J., Harrison—At a meeting of the State Hgwy. Bd. plans were approved for the construction of a temporary bridge over the Hackensack River at Harrison connecting the extension of Route No. 1 through Hudson Co.

O., Newark—The $3,000 5½% Bridge Repair bonds have been approved.

Pa., Germantown—Lincoln Dr., over Cresheim Rd., $100,000; Henry Ave., over Lincoln Dr., $1,000,000; Henry Ave., over the Reading Ry., $400,000.

Pa., Mount Airy—Mount Airy bridge over the Reading Ry., $70,000.

W. Va., Benwood—Benwood City Council have decided to advertise immediately for the construction of a new bridge over McMichen run, the dividing line between McMechen and Benwood.

MISCELLANEOUS

Ariz., Salt River Valley—Radio control of an irrigation project comprising some 200,000 acres of reclaimed land in Arizona is the latest use to which radio has been put by the government. The Salt River Valley Water Users' Association, a local agency controlling the Salt River irrigation, has installed and equipped a radio house toward the source of the Verde River, their natural water supply.

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Fla., Tampa—Circuit Judge F. M. Robles yesterday issued a decree validating the $600,000 city bond issue recently voted for harbor improvements, the decree being asked by the city.

Fla., Jacksonville—The $480,000 to be spent here the coming year will cover two projects. The present 30-ft. project from Jacksonville to the sea with some maintenance work on the jetties will get $450,000 of it, while $30,000 will be spent on the 9-ft. project from Jacksonville to Palatka. Still in the stage of survey, report, etc., is the 35-ft. project from Jacksonville to the sea, which will not be a subject for appropriation for some time.

Ida., Twin Falls—Acting for the Idaho Reclamation Association, Guy Flenner, its manager, has filed a petition asking for an election to determine the organization of the largest irrigation district ever attempted in America to finance the American Falls reservoir project. The petition represents 142,000 acres or 21,000 more than a total of about 490,000 in the proposed district. The estimated cost of the dam and reservoir proposed is $12,000,000, of which the government will pay about half.

N. J., Trenton—An ordinance authorizing the construction of a concrete wall along a part of the westerly side of John Fitch Way.

Wis., Milwaukee—Bonds have been sold by the city and money is ready to begin the work. Among the big projects are State St. bridge, $285,000; widening of Cedar and Biddle Sts., $2,500,000; Folsom Place bridge widening, $150,000; Cedar St. bridge, $850,000; 16th St. viaduct, $850,000; central police station, $500,000; school construction, $1,514,000; vocational school, $450,000; sewer improvements, $609,000, and $520,000 remaining from an old issue for street widening.

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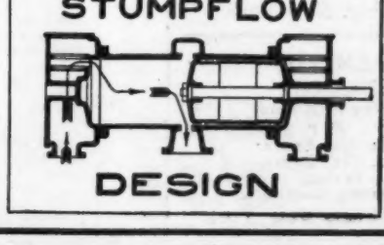

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(See Paving Machinery also)

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The Duff Mfg. Co.

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American Bridge Co.
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Wyckoff Pipe & Creo. Co., Inc.

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Blaw-Knox Co.
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Buckets, Clam Shell

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See Alphabetical Index on last white page

INDEX TO ADVERTISEMENTS

	Page
A	
Acme Road Machinery Co.	4
Alvord, Burdick & Howson	20
American Appraisal Co.	20
American Cement Machine Co., Inc.	—
American La-France Fire Engine Co.	—
American Tel. & Tel. Co.	—
Asphalt Association	—
Atlas Powder Co.	—
Aurora Pump & Mfg. Co.	—
Avery Co.	—
B	
Badger Meter Mfg. Co.	23
Ball Engine Co.	4
Barrett Co., The	—
Bissell Company, F.	—
Black & Veatch	20
Blaw-Knox Co.	—
Broadway Central Hotel	4
Brossman, Chas.	20
Buffalo Springfield Roller Co.	5
Burch Plow Works	—
Burns & McDonnell	20
C	
Caird, James M.	20
Carey, Philip, Co.	—
Clark, H. W., Co.	—
Coldwell-Wilcox Co.	8
Collins, J. L.	20
Columbia Wagon & Body Co., Inc.	2
Conant Machine Co.	—
Connery & Co., Inc.	4
Cook, A. D.	—
Cressy Road Sprayer Mfg. Co.	5
Cummer & Son, F. D.	6
D	
Davis, B. H.	20
Dee, Wm. E., Co.	—
Detroit Trailer Co.	2
Dixon, Jos., Crucible Co.	—
Dow & Smith	20
Duff Mfg. Co., The	—
Du Pont de Nemours Co., E. I.	—
E	
East Jersey Pipe Co.	—
East Ohio Sewer Pipe Co.	21
Electro Bleaching Gas Co.	8
Emerson Pump & Valve Co.	—
Erie Steam Shovel Co.	4
F	
Farasey, J. D., Mfg. Co.	—
Fraizier Ellms-Sheal Co.	20
G	
Gamon Meter Co.	—
Goodyear Tire & Rubber Co.	—
Green, L. P., Co.	—
H	
Hansen, A. E.	20
Hazen, Whipple & Fuller	20
Headley Good Roads Co.	4
Heil Company	7
Heltzel Steel Form & Iron Co.	—
Hetherington & Berner	4, 5
Hersey Mfg. Co.	23
Hill & Ferguson	20
Holt Mfg. Co., Inc.	—
Honhorst Co., The Jos.	—
I	
Independent Concrete Pipe Co.	19
Ingersoll-Rand Co.	—
Ingram-Richardson Mfg. Co.	23
J	
Jaeger Machine Co.	7
K	
Kinney Mfg. Co.	3
L	
Loper Fire Alarm Co.	—
M	
Maclachlan Reduction Process Co., Inc.	20
Marine Metal & Supply Co.	19
Mueller Mfg. Co.	—
N	
Nat'l Cast Iron Pipe Co.	8
Nat'l Moulding Press Corp.	—
Nat'l Water Main Cleaning Co.	8
Newport Culvert Co.	—
New York Continental Jewel Filtration Co.	8
Norwood Engineering Co.	8
O	
Ohio Municipal Equipment Co.	6
Ohio Vitrified Pipe Co.	7
Orton & Steinbrenner Co.	4
P	
Pacific Flush-Tank Co.	—
Pawling & Harnischfeger Co.	3
Penn. Salt Mfg. Co.	—
Pittsburgh Meter Co.	23
Pollock, Clarence D.	20
Potter, Alexander	20
R	
Republic Iron Works	—
Robinson Clay Product Co.	7
Ruberoid Co.	—
Russell Grader Mfg. Co.	—
S	
Sanitation Corporation	5
Schramm, Inc.	—
Servicized Products Co.	12
Skinner, Frank W.	20
Smith, A. P., Mfg. Co., The	8
South Bend Foundry Co.	6
Stacy-Bates Co.	6
Standard Oil of Indiana	3
Standard Oil Co. (N. Y.)	2
Sterling Eng. Co.	—
Stewart, W. H.	—
Stumpf Una-Flow Engine Co.	19
Sweet's Steel Co.	2
T	
Texas Co.	24
The Martinique	—
Thomson Meter Co.	8
Tiffin Wagon Co.	—
Truscon Steel Co.	—
U	
Union Water Meter Co.	6
U. S. Cast Iron Pipe & Fdy. Co.	6
Universal Road Mach. Co.	—
V	
Vulcan Incinerator Co.	6
W	
Warren Bros. Co.	—
Weber, F., Co.	—
Wiard Plow Co.	—
Wood, R. D., & Co.	5
Wyckoff Pipe & Creo. Co., Inc.	4
Wyckoff & Son Co., A.	—

BUYERS' CLASSIFIED DIRECTORY
(CONTINUED)

STREET CLEANING AND REFUSE DISPOSAL

Ash Bodies
Heil Co.

Carts
Acme Road Mchy. Co.
Columbia Wagon & Body Co
Tiffin Wagon Co.

Garbage Bodies, Steel
Columbia Wagon & Body Co.
Heil Co., The

Manholes—Catch Basins
Burch Plow Works Co.
Wm. E. Dee Co.
South Bend Foundry Co.

Incinerators
Stacy-Bates Co.
Vulcan Incinerator Co.

Shovels
Wyoming Shovel Works

Sprinkling Wagons and Flushers
Austin-West. Rd. Mach. Co.
Good Rds. Mchy. Co., Inc.
The Kinney Mfg. Co.
Tiffin Wagon Co.

Street Flushing Hose
Goodyear Tire & Rubber Co.

Street Sweepers
Austin-West. Rd. Mach. Co.
Ohio Municipal Equip. Co.

STREET SIGNS
Ingram-Richardson Co.

WATER WORKS

Air Compressors
Ingersoll-Rand Co.
Schramm, Chris. D., & Son
Sullivan Machy. Co.

Air Lift
Ingersoll-Rand Co.

Brass Water Connection
Mueller, H., Mfg. Co.

Centrifugal Pumps
Aurora Pump & Mfg. Co.

Chloride of Lime
Penn Salt Mfg. Co.

Chlorine Liquid
Electro Bleaching Gas Co.

Deep Well Drills
Ingersoll-Rand Co.

Deep Well Pumps
Aurora Pump & Mfg. Co.
Cook, A. D.
Ingersoll-Rand Co.

Disinfecting Chemicals
Electro Bleaching Gas Co.
Penn Salt Mfg. Co.

Filters
N. Y. Continental Jewel Filtration Co.

Filtration Plants
Norwood Engineering Co.

Filter Alum
Du Pont de Nemours Co.

Fire Hydrants
Clark Co., H. W.
R. D. Wood & Co.

Flap Valves
Coldwell-Wilcox Co.

Meters
Badger Meter Mfg. Co.
Clark Co., H. W.
Hersey Mfg. Co.
Pittsburgh Meter Co.
Thompson Meter Co.
Union Water Meter Co.

Meter Boxes
H. W. Clark Co.
Pittsburgh Meter Co.

Meter Testing Machines
H. W. Clark Co.
Mueller, H., Mfg. Co.
Pittsburgh Meter Co.

Pipe, Cast Iron
National Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe, Steel
East Jersey Pipe Co.

Pipe, Wood
A. Wyckoff & Son Co.
Wyckoff Pipe & Creo. Co., Inc.

Pumps
Aurora Pump & Mfg. Co.
H. W. Clark Co.
Cook, A. D.
Schramm, Chris. D., & Son
Sullivan Mchy. Co.

Pumping Engines
Schramm, Chris. D., & Son
Sterling Engine Co.

Screens for Wells
Cook, A. D.

Service Boxes
Mueller, H., Mfg. Co.

Shear Valves
Coldwell-Wilcox Co.

Sleeves and Valves
Mueller, H., Mfg. Co.
Smith, A. P., Mfg. Co.

Sluice Gates
Coldwell-Wilcox Co.

Sprinkling and Flushing Hydrants
Mueller, H., Mfg. Co.

Steel Stacks
Heil Co., The
Honhorst, Jos., Co.

Strainers
Cook, A. D.

Tanks
Farasey, J. D., Mfg. Co.
Heil Co., The
Honhorst, Jos., Co.

Tanks, Towers, Standpipes
Connery & Co., Inc.
Farasey, J. D., Mfg. Co.

Tapping Machines
Mueller, H., Mfg. Co.
Smith, A. P., Mfg. Co.

Tunnel Liner Plates
Truscon Steel Co.

Valves
Clark Co., H. W.
Mueller, H., Mfg. Co.

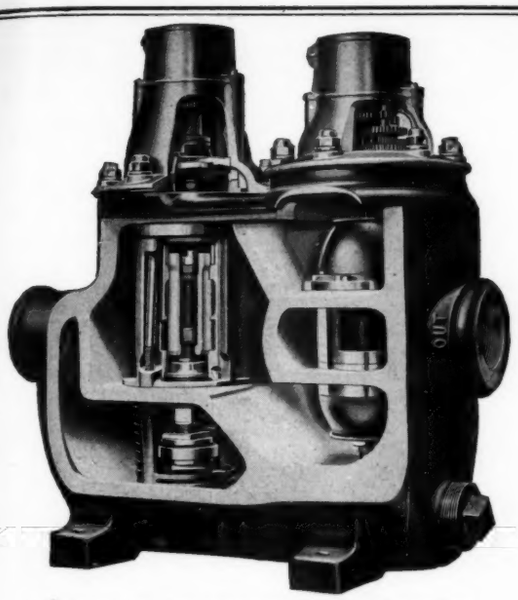
Water Main Cleaning
National Water Main Cleaning Co.

Water Purification
Electro Bleaching Gas Co.
N. Y. Continental Jewel Filtration Co.

Water Sterilization
Electro Bleach Gas Co.

Water Strainers
Mueller, H., Mfg. Co.

Water Supply from Well Systems
Cook, A. D.
Heil Co., The



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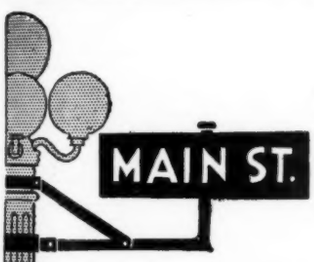

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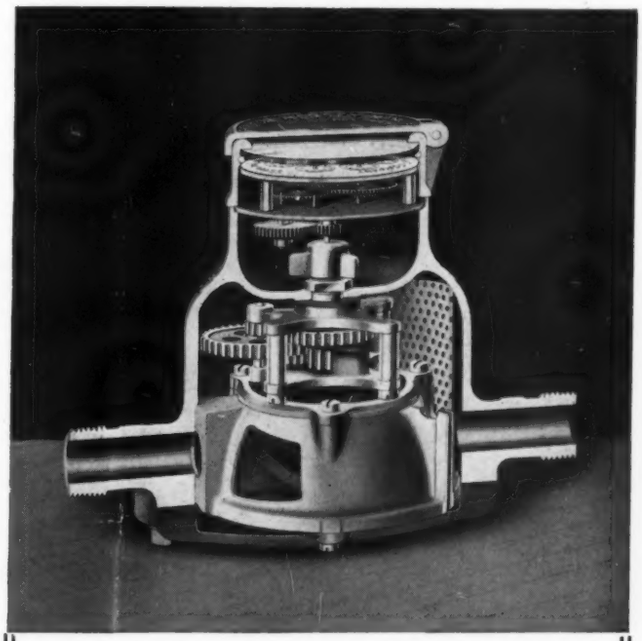

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